SPECIAL LOUISIANA PURCHASE NUMBER

The JOURNAL of GEOGRAPHY

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An illustrated monthly magazine devoted to the interests of teachers of geography in the nursery, academy, and normal schools

Edited by RICHARD E. DODGE, Professor of Geography, Teachers College, Columbia University, New York City, and EDWARD M. LEHNERTS, Professor of Geography, State Normal School, Whitewater, Wisconsin

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THE LOUISIANA PURCHASE

The Mississippi Valley was destined to become the core of the nation as it was of the continent. Its fertile soil would support a dense population, and its cheap waterways were to prove of inestimable value for a young, agricultural people. The acquisition of the new West prolonged greatly the most distinctive feature of American anthropo-geographic conditions — the abundance of free land. A nation is influenced not only by the topography, but by the size of its territory. The presence of the new West reacted most wholesomely upon the East and the old West; the stimulating effect of inexhaustible opportunity never allowed American energy to abate, and the democratic spirit of the ever youthful frontier fostered the spirit of democracy and youth in the whole nation.

ELLEN CHURCHILL SEMPLE

XUM

FIG. 2. *Cloud Peak, the culmination of the Big Horn Mountains, Wyoming, showing a hanging glacier.*
(See article by N. H. Darton, page 251.)

The JOURNAL *of* GEOGRAPHY

VOL. III. JUNE, 1904 NO. 6

THE GEOGRAPHIC IMPORTANCE OF THE LOUISIANA PURCHASE

BY ALBERT PERRY BRIGHAM

Professor of Geology in Colgate University, Hamilton, New York

THE American of our time does not find it easy to think of a country hemmed in by the Mississippi River. This means no Great Plains, no Rocky Mountains, no Sierras, no Big Trees, no Golden Gate, and no Pacific Ocean. Jefferson's envoys did not, indeed, buy to the western sea, but their bargain held in it the westward sweep of a hundred years. We need have a care lest we read into Jefferson's prophetic mind all that we see, looking backward. And thinking ourselves wise, and of sharp eyes to read the meaning of history, we may suspect that we also fail to measure the significance of the things done in these present days. If we have optimism, we shall suspect also that the fears of some good people are as needless as the fears of other good people, who for almost a century have slept with their fathers.

The Louisiana Purchase was big, if we measure it in mere acres, or in a row of figures representing square miles,—well on toward a million of them,—more by some forty thousand than belonged to the old thirteen states. It was as if, owning a hundred acres, the farmer bought the adjoining farm, a larger one, at a price which seemed steep, and with this difference, that he should not know much about his new acres. However it might be, the distant owner wanted to sell, and Uncle Sam, with perhaps more instinct than knowledge, did not dare let the chance pass.

We can see that the price was nominal, and we need but write the word Iowa; and then come Missouri, the better part of Minnesota, and the states beyond, making the larger half of that heart of the land which we mean when we say the Prairies and Great Plains. But

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this is only the beginning, for we go south and find Arkansas, Oklahoma, the Indian Territory, and Louisiana, another group that would make a kingdom. And again we have the higher plains of Kansas, Nebraska, and the Dakotas, and most of Montana, Wyoming, and

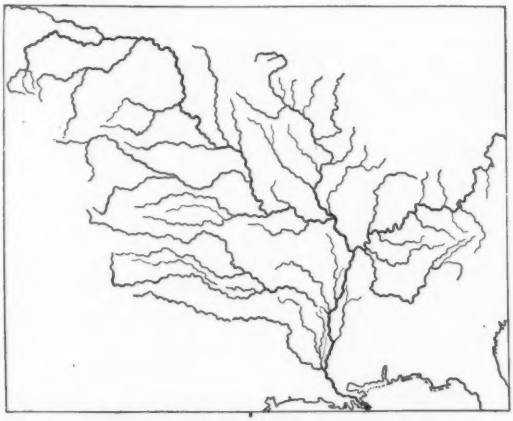


FIG. 1. *The Mississippi River system, showing the vast area and watered surface included in the Louisiana Purchase.*

Colorado. So ran the new possession, from the Gulf to the 49th parallel, from the Lake of the Woods to the Rocky Mountains, distances that are bewildering, areas that we travel over but never truly appreciate, an empire in which an average European state might be lost.

To many doubting citizens of New England the settlements beyond the Cumberland Gap seemed far away and of doubtful worth, while the nation, the wealth, the intelligence, and the sound judgment in public affairs were east of the Appalachians. Viewed with their perspective, the Mississippi was hardly so big as the Connecticut and it is not strange that their world faced eastward. But long before Alaska was bought, or American abodes were found in the Pacific, the geographical center of our territory had migrated to Northern Kansas. And now our population center is in Indiana, and the center of manufactures follows hard on in Ohio, and if there is in America a pivotal area, it is in the upper Mississippi Valley.

When Illinois and the balance of the old Northwest were won, we were assured of respectable fields of wheat and corn, but we could

not have entered the markets of the world. For this we must have the prairies beyond the river, as well as on the hither side, and run on a thousand miles to the plateau of Oregon and Washington and the valleys of California. In any reckoning of the values of the Louisiana Purchase, we must not forget that it made possible all that lay between its zigzag western boundary and the Pacific Ocean. Across it was the path to Texas, to the Mexican Territory, and the waters of the Oregon; and this northern path was trodden without delay by Lewis and Clark, though forty-three years were to pass before Britain finally yielded her claim to Oregon.

If ever figures could be quoted without dulling the edge of truth, it would seem that we might do it here. The wheat production of the Louisiana tract alone in 1900 was more than half that of the entire United States. The corn crop of that year came up to forty-eight per cent of our total, the two grains amounting within the area to $464,000,000. This says nothing of oats, barley, rye, potatoes, hay, and cotton. In 1900, also, this area raised more than one-third of the wool of the United States, and adding sugar, and live-stock

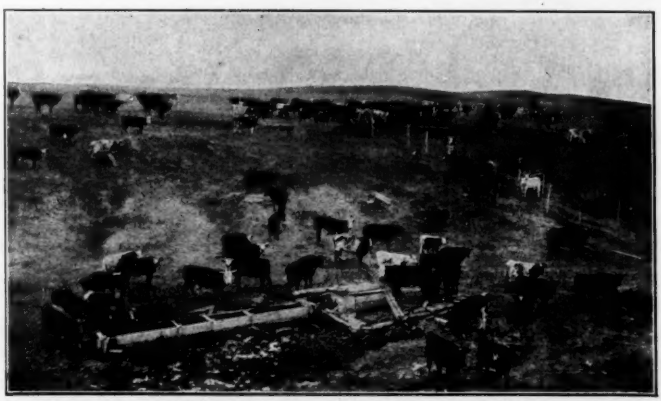


FIG. 2a. *A scene on a Dakota cattle range. Thousands of similar herds scattered over the western prairies and grazing areas, make the Louisiana Purchase region a rich cattle country.*

products, the census expert affirms that one per cent of the farm products for that year would meet the price agreed upon by Livingston and Monroe and sanctioned by Congress.

Without Louisiana, Chicago might be an Indianapolis or a Toledo, and New York herself, we need not fear to say, would not be the second

city of the world and might be running a race with Montreal or New Orleans for the primacy of North America. Without the herds and harvesters of Prairies and Plains, who should feed the East and where would the sons of New England have had a chance to grow up, or the colonizing energies of the eastern seaboard a place to disport themselves? We have not merely a country by so much bigger, but a land of more men, more mills, more variety of industry, and of intenser life.

The lumbermen of the Southern Appalachians are slashing the forests with ruinous hand; every hamlet shows its sawmills and stacks of lumber, and the washed and barren slopes tell of the tardy hand of the national government, which might stay the ravage. Outside of this disappearing wealth of forest, the great reserves are largely

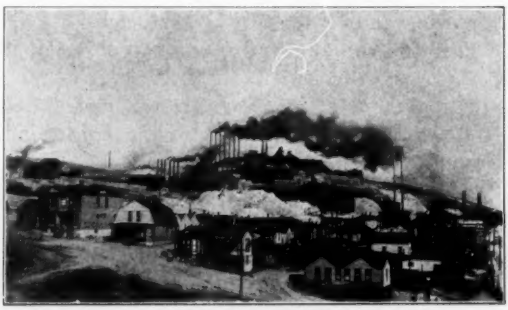


FIG. 3. *Copper mines, Butte, Montana.*

found in Arkansas, in Louisiana, and in Texas; or, leaping again past the Rocky Mountains, they cover the slopes of the Sierras, and mantle with the densest forests of North America parts of the Cascade and Olympic ranges. We should not have any of these but for Louisiana. We will not say that all hinged on the bargaining of a particular year, or of one administration, for the westward current of American life was too strong to be long checked. It had within a generation rolled over the Appalachians, and was in no danger of being permanently restrained from the long incline that leads up to the Rocky Mountains. The particular deeds of history that make most of what is put into the books are but culminating expressions of the larger life that does not depend on accidents or persons.

To speak of Montana, South Dakota, or Colorado is to name a synonym for the wealth of the mines. In 1901 Colorado yielded more than $27,000,000 of gold and above $18,000,000 in silver, while the two

other states made a combined showing of $24,000,000 of the precious metals. Thus is the price of the Jefferson purchase told over and over again as the years go on. And here too with equal justice we must count the enormous mineral values of Idaho, Utah, Nevada, Arizona, California, Oregon, and Washington. Let students skilled in political economy say what must have been the lot of a nation which could not mine enough gold and silver to be worthy of mention. Such would have been our condition if we had been held between the Lakes and the Gulf, the Mississippi and the Atlantic. More nearly would the west be sufficient to herself, with her stores of iron and her coal fields stretching into thousands of square miles. If a half empire is conceivable, it might stand by the Pacific rather than on the Atlantic side of North America.

Nor can we imagine that a Washington government would ever have bought Alaska, if we could not have sailed to her shores from our own western ports. Then as in 1803 and in later times we have been charged with paying too much for lands that we ought not to buy at all. Alaska may never pay for herself more than a hundred times in one year, but she has at least returned Seward's seven millions in her government revenues, and each short summer extends the search for her wealth. This also follows upon Louisiana.

Reference has elsewhere been made by the writer* to a curious question placed at the head of a review article a few years ago: "Two Republics or One?" Could the East and the West Live Together? Were They not Divided on Every Great Public Question? Would They not in Time Agree to Live Apart, Drawing Their Common Boundary Down the Mississippi River?

And within a few weeks another writer in the same review has argued that "with a republic on one side and European sovereignty on the other, the Mississippi would to-day be bristling with cannon." All this is interesting as speculation, but never had any basis of probability. The vicissitudes of the shifting rule of English, French, and Spanish in the valley could not last forever, but the turmoil must endure until the great valley became all one thing or all another. The confusion ended when the new power in the east gained enough expansive energy and enough men and women to push across the muddy tide and claim the fertile lands beyond. If this had not happened in 1803, it would have been done in 1823, or at some other time when the fates favored. And if it had not been done by purchase, it would

* Geographic Influences in American History, p. 321.

FIG. 4. *Gold mines in Colorado. The wealth obtained from the output of the gold mines alone, repays vastly the original expenditure of money paid to France for the Louisiana Territory*

have come by colonization and by the affinity of a frontier people for their own.

A river does not cleave a land in twain, but is rather a bond of union. Most of the great rivers of the world are examples,—the Amazon, Rio de la Plata, the Nile, and the rivers of Asia. If you turn to the map of Europe, you may trace the course of the Volga, the Rhone, the Po, the Rhine, and the Danube. These streams flow through the heart of kingdoms. The lands slope toward a river; its branches belong to it as if it were a tree; while the waters and the commerce of both sides move together to the sea. If a river lies athwart a line of military movement, it is an inconvenience rather than a prohibition, and the most that can be said is that it is a weak spot in the chain of communication of an advancing army.

On the east, the Mississippi reaches long arms into New York and Pennsylvania, meets the Piedmont in the headwaters of the New River in Virginia, and holds sway over the mountains of the South by the many affluents of the Tennessee. The grasp of the Missouri and the Arkansas is even more expansive, and a division of empire by the trunk stream is hardly to be imagined. Irritation, not to say warfare, must have been constant, if the Mississippi as a commercial highway were not possessed by one people. Wilkinson's intrigues for joining Kentucky to Spanish power, traitorous as they were, were also per-

fectly logical, if Louisiana and New Orleans were not to belong to the United States. Those early days made experiment of dividing the Mississippi along its course and failed. Later years down to the Civil War made trial of cutting the Mississippi into upper and lower halves. The simple and eloquent words of Lincoln in 1863—"The Father of Waters now flows unvexed to the sea"—might have cast their meaning back over all American history, for now first in our own time does the physical unity of the valley begin to find expression in social and historical solidarity. Galveston, Kansas City, and Omaha, or Chicago, Memphis, and New Orleans, more and more will point the way along the lines of social and commercial interchange.

We can hardly suppose that Jefferson, or his diplomats, or his explorers even dimly knew that they were transforming the nation into a world power. After Lewis and Clark had accomplished their mission, almost nothing was known of the riches of the Columbia basin and fifty years were to pass before railway surveys toward the Pacific were well in hand. The Plains were the Great American Desert of every schoolboy's geography, and not until 1849 did the greatness of California begin. And it has been left for the last ten years to tell us the meaning of our Pacific shore line. A friend whose wife is at this moment visiting in Los Angeles tells the writer that he was looking up her proposed journey thence to a point in Oregon. It had seemed like a run from Boston to New York. He found it was nearly a thousand miles. Doubtless half of the boys and girls in our high schools

FIG. 5. *Shipping wharf on the Mississippi River levee at New Orleans. This port has grown rich from the outflow of products through it from the Louisiana Purchase territory.*

would be surprised to find that if California were reversed and superimposed on the Atlantic coast, it would stretch from Boston to Charleston.

But the Pacific coast has its meaning not so much in its length, as in the Golden Gate, in the estuary of the Columbia River, and in Puget Sound. These are the gateways that lead out to Alaska, to Hawaii, to Manila, China, and Japan. Not less does Louisiana find its logical outcome in the Isthmian Canal, in preponderant influence in the Western Hemisphere, and in more complete use of the highways and resources of all Pacific lands. The Pacific outlet puts us in easy communication in the near future with at least 500,000,000 of people, and opens possibilities that outrun the most daring imagination.

Three of the seven greatest ports of the United States belong to the territory which was foreign until 1803; these are New Orleans, Galveston, and San Francisco, and it requires no seer to place the lower Columbia River and the cities of Puget Sound among the first centers of foreign commerce. Our great territory has given us room for all kinds of people and for many millions of them. We have had open doors toward Europe and acres enough to receive her children. The number and the cosmopolitan breadth of our population have been possible through the expansion which made its vastest stride in 1803. Adding to the weight of adequate numbers the variety and bulk of our natural resources, we became a nation largely sufficient to ourselves and able to reach out and hold what the unfolding of the years puts into our hand. For nations as for men, "To him that hath shall be given" is law inevitable.

That we should have more land, more men, more corn and wheat, silver and gold, that we should be many and rich, has flowed from the bargain of 1803. But beyond all this and higher, is the unfolding genius of our people, which was in no small way then determined. We were then assured of the long possession of a *frontier*, which means toil, danger, plasticity, and free evolution of institutions. We have had a hundred years of migrating frontier, marking an epoch from which we are now passing, but whose consequences we shall not soon outrun. We have had daring exploration, we have sketched in the outlines of a new civilization on fresh ground, and this new creation is now to be perfected in detail. We have had the discipline of long distances, the strain of diverse climates, the appropriation of untried resources, and we are now to watch the growth of new types of society, industry, and, it may be, of letters and the higher life.

Jefferson did not shrink from saying that they had done something outside of the Constitution, but the Constitution grew by interpretation rather than by formal amendment. Events and not theory developed the corporate life of the nation then as to-day. It was then that the first notes of secession were sounded, and they were heard—from Massachusetts! The great New England Commonwealth was more interested in fisheries than in a continent, but we must not judge her in the light of our knowledge. She said that the original balance of power was broken, that Virginia was all in all, that the South was outweighing the North in the counsels of the nation, and that the new slaveholding states that would arise across the Mississippi would leave her a cipher in the Union. We can hardly wonder at her fears, but looking backward we can see that the Louisiana Territory did indeed precipitate the struggle over slavery, but that it was also the great Northwest, the wide north end of old Louisiana, which turned the scale at last on many bloody fields for freedom and the Union.

We need not believe, without limit, that Jefferson was "the broad statesman who saw beyond the Mississippi, over the Rockies to the Pacific, and over the Pacific to the cradle of the world." We may hail him not only because he was wise, but also because he was wiser than he knew.

THE SURFACE AND CLIMATE OF THE LOUISIANA PURCHASE

BY N. H. DARTON

Of the United States Geological Survey, Washington, D. C.

STRETCHING from north to south entirely across the middle United States, the region of the Louisiana Purchase naturally presents great diversity of surface configuration and climate. There are lowlands and mountains, hills and plains, prairies and forests, with climatic conditions varying from cold to warm, and from moist to nearly arid. The mountains rise to altitudes of over 14,000 feet and the lowlands extend to tide water in the Gulf of Mexico. The plains and prairies occupy over a million square miles, and range in altitude from 200 feet and less in the lower Mississippi region to the high plains of Colorado, of which the more elevated portions reach 7,000 feet. The dominant features of topography are the products of deposition and erosion by the western tributaries of the Mississippi River.

FIG. 1. *Canyon of Tongue River, Big Horn Mountains, Wyoming. The limestone walls are over one thousand feet high, and the gorge is typical of these mountains.*

This river drains all of the region excepting its northeastern corner, out of which flows the Red River of the North, a stream emptying into Hudson Bay.

Mountains. From the Arkansas Valley in Colorado, northward through Colorado, Wyoming, and Montana, the western portion of the Purchase includes the Rocky Mountain Range which rises steeply 6,000 feet and more above the Great Plains extending far eastward from its foot. The high front range of these mountains trends nearly due north and south through central and northern Colorado and south-central Wyoming, passing a short distance west of Colorado Springs, Denver, and Cheyenne. Though several of its peaks rise to over 14,000 feet above the sea level, it is not the main continental divide between the waters of the Atlantic and Pacific oceans, for branches of the Platte and Arkansas head behind it. In Wyoming the front ridge is known as the Laramie Range and it is crossed by the Union Pacific Railroad at Sherman west of Cheyenne, where its altitude falls to 8,251 feet. The elevation increases again northward in Laramie Peak, north of which it soon sinks into high plains or off-sets west to the Wind River Range. The latter, merges into the Shoshone and Absaroka ranges, which extend north through northwestern Wyoming on the east side of Yellowstone Park. Thence through Montana the Rocky Mountains continue as a high range to and into Canada, forming the divide between the headwaters of the upper Missouri and Columbia rivers.

The Rocky Mountain Range thus forms the northwestern boundary of the Louisiana Purchase region, a huge rampart of high, rocky ridges interrupted by a high, wide valley in central-southwestern Wyoming, but elsewhere crossed only by elevated mountain passes from 8,200 to 12,000 feet in altitude and a few deep canyons through the Front Range in Colorado and southern Wyoming. These mountains have not had the effect of halting the tide of western progress, as in the case of the Appalachian ranges, for railroads and highways were extended across them in the earliest days of the great movement westward, and a large proportion of the settlers and miners pressed forward to the western slope without stopping at the foot of the mountains. The growth of the great city of Denver is due more to the presence of the mineral deposits in the mountains just west than to a halt in westerly progress.

The Bighorn Mountains are an outlying range of the Rocky Mountains in northern Wyoming, rising to an altitude of over 13,000 feet

FIG. 3. *Devil's Tower, on the banks of the Belle Fourche, northwestern slope of the Black Hills, Wyoming (Igneous rock).*

and, together with the Wind River and Shoshone ranges, constituting a great horseshoe-shaped zone of highlands enclosing the wide valley known as the Bighorn Basin.

The Black Hills are a small group of mountains which rise several thousand feet above the Great Plains in western South Dakota and eastern Wyoming. Having abundant rainfall, they constitute, through their streams and vegetation, an oasis in the semi-arid region. The hills are carved from a dome-shaped unlift of the earth's crust and consist largely of older rocks containing valuable minerals.

There extends from west-central Arkansas through Indian Territory into southern Oklahoma a series of low mountain ranges known as the Ouachita and Wichita Mountains which rise from 800 to 1,100 feet above the surrounding plains. These are peaks of an old upland, now nearly buried by sediments, to which some further prominence has been given by uplifting and folding.

The mountains of the Louisiana Purchase region are due mainly to uplift or arching of zones of the earth's crust at various geologic periods, which have brought the older and harder rocks into prominence. The mountains have existed for a long period and not only have been the principal source of most of the deposits of the adjoining plains but, in a portion of the area, were the margins of seas by which many of the sediments were laid down.

Great Plains. The term Great Plains is applied to the vast area of relatively smooth lands extending eastward from the foot of the Rocky Mountains to the valley of the Mississippi, where they merge into the prairies on the north and the low plains adjoining the Gulf Coast and the Mississippi embayment on the south. The Plains present wide areas of tabular surfaces traversed by broad, shallow valleys of large rivers rising mainly in the Rocky Mountains, and they are more or less deeply cut by narrower valleys of the lateral drainage. The smooth surfaces and east-sloping plains are the characteristic features but in portions of the province there are buttes, extended escarpments

and local areas of bad-lands. Wide districts of sand hills surmount the plains in some localities, notably in northwestern Nebraska, where high sand dunes occupy an area of several thousand square miles. The province is developed on a great thickness of soft rocks, sands, clays, and loams, generally spread in thin but extensive beds sloping gently ' stward with the slope of the plains. These deposits lie on relatively smooth surfaces of the older rocks. The materials of the formations were derived mainly from the west and were deposited, layer by layer, either by streams on their flood plains or in lakes and, during earlier times, in the sea. Aside from a few very local flexures, the region has not been subjected to folding, but has been broadly uplifted and depressed successively. The general smoothness of the region to-day was surpassed by the almost complete planations of the surface during earlier epochs. Owing to the great breadth of the plains and their relatively gentle declivity, general erosion has progressed slowly, notwithstanding the softness of the formations, and, as at times of freshets many of the rivers bring out of the mountains a larger load of sediment than they can carry to the Mississippi, they are now building up their valleys rather than deepening them.

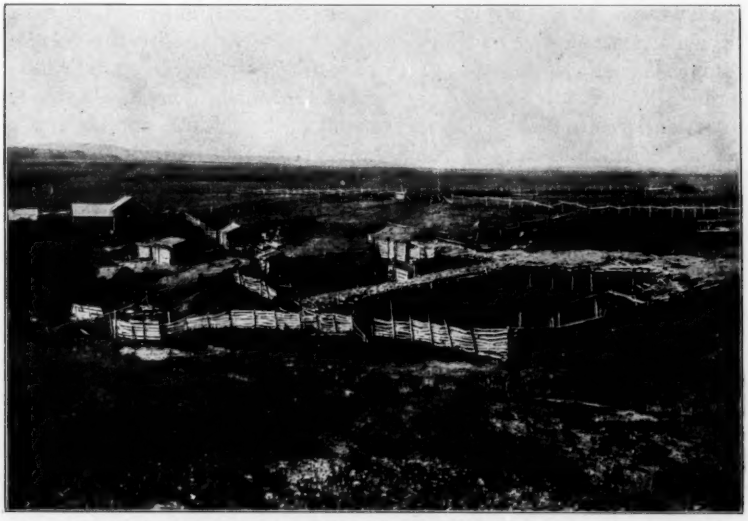


FIG. 4. *Sam's Ranch, in the Bad Lands. A typical view of the Great Plains and cattle ranch in central South Dakota.*

The Great Plains province as a whole descends to the east about 10 feet to the mile from altitudes approaching 6,000 feet at the foot of the Rocky Mountains to from 1,000 to 300 feet above the sea near Mississippi River. The altitudes and rates of slopes vary considerably in different districts, particularly to the north, along the middle course of the Missouri River, where the general level has been greatly reduced. West of Denver the central plains have an altitude of 6,200 feet at the foot of the Rocky Mountains, and this elevation is sustained far to the north along the foot of the Laramie Mountains. High altitudes are also attained in Pine Ridge, a great escarpment which extends from near the north end of the Laramie Mountains eastward through Wyoming, across the northwest corner of Nebraska, and for many miles into southern South Dakota. This so-called "ridge" marks the northern margin of the higher levels of the Great Plains, and presents cliffs and steep slopes descending a thousand feet into the drainage basin of Cheyenne River, one of the most important branches of the Missouri. From this basin northward there is a succession of other basins with relatively low intervening divides, which do not attain the high level of the Great Plains to the south. The southwestern extension of the high plains is found in the "Staked Plains" of Texas and eastern New Mexico, which slope up to an altitude of 5,000 feet. The northern portion of the Great Plains is drained by the middle branches of the Missouri River, of which the larger members are Yellowstone, Powder, Little Missouri, Grand, Cannonball, Moreau, Cheyenne, Bad, and White rivers. On the summit of Pine Ridge not far south of its northern margin is Niobrara River, which rises in the midst of the high plains some distance east of the northern end of the Laramie Mountains. To the south are Platte River with two large branches heading far back in the Rocky Mountains, the Rio Grande, and Arkansas River, which crosses the plains to the eastward and affords an outlet for the drainage from a large watershed of mountains and plains. Between the Rio Grande and the Arkansas are Cimarron River and numerous smaller streams heading in the western portion of the plains. Between the Arkansas and Platte rivers is Republican River, rising near the one hundred and fifth meridian, and an extended system of local drainage in eastern Kansas and Nebraska.

Mississippi Embayment. The southern extremity of the Louisiana Purchase occupies the western portion of the great embayment of the Mississippi River. This is a region of lowlands or coastal plain extending nearly 600 miles up the present Mississippi Valley to Cape Girardeau

and marking the area of a former northward extension of the Gulf of Mexico. The altitudes in this district are low, ranging from tide level at the coast to about 200 feet above Memphis and around its eastern and western margins where the lowlands merge into adjoining rolling prairies. Above Cape Girardeau the Mississippi Valley is a wide, shallow gorge with rock walls. This changes abruptly at the Cape, 140 miles below St. Louis, and thence southward the great stream flows through a vast alluvial flat, meandering widely in its own deposits, in curves and loops with frequent changes of course.

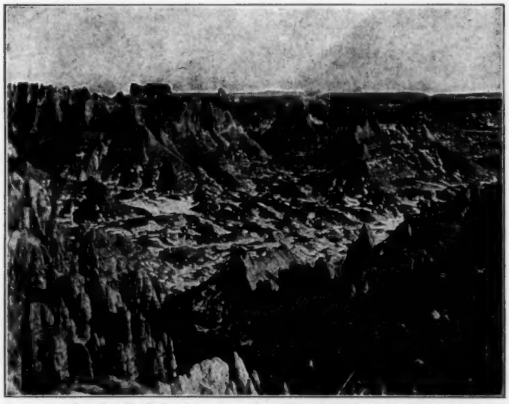


FIG. 5. *In the Bad Lands of western South Dakota. This shows an area of lower clays, and divides of soft sandstone.*

Below the mouth of the Arkansas are wide areas of swamps, with bayous and side channels, which occupy an extensive area below Vicksburg, especially about the mouth of Red River.

Rivers. The Louisiana Purchase is bounded on the east by the Mississippi River, one of the longest bodies of moving water in the world. This stream extends from near the northern margin of the United States to the Gulf of Mexico, with a length of 2,553 miles and a fall of 1,535 feet. It is estimated that its average daily discharge is over fifty billion cubic feet, and this amount is greatly increased when floods occur. Its principal affluent on the west is the Missouri River, a stream which flows entirely across the Purchase, its main headwaters rising in the Rocky Mountains in the extreme northwestern corner of the region. Its length is about 3,000 miles, in which it falls 12,000 feet, joining the Mississippi at an altitude of about 400 feet at St.

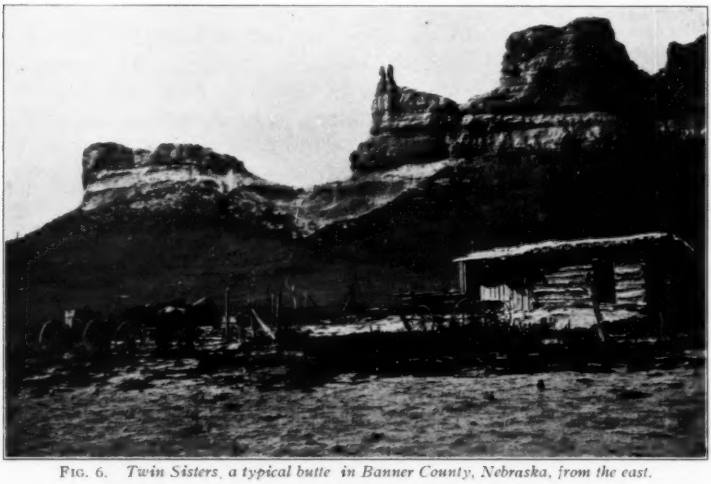


FIG. 6. *Twin Sisters, a typical butte in Banner County, Nebraska, from the east.*

Louis. Its average volume of water a day at its mouth is ten billion cubic feet. The longest affluent of the Missouri River is the Platte River which rises in the Rocky Mountains in southern Wyoming and northern Colorado and empties into the Missouri River at Plattsmouth a few miles below Omaha. Its daily flow averages nearly a half billion cubic feet. The Yellowstone-Bighorn River system is the next longest affluent, flowing north out of northwestern Wyoming and northeastward across the southeastern corner of Montana. It has a larger volume than the Platte but the amount of flow has not been ascertained. The Kansas River, which flows across the northern portion of Kansas, is a large stream, and in the spring of 1903 this river was the principal cause of the great flood in the lower portion of Kansas City. The Missouri River receives but relatively little drainage from the east, the Big Sioux River being its principal affluent on that side. Its larger branches mostly rise in the mountains and bring vast volumes of water from the melting snow and great watersheds. The Missouri River and lower Mississippi River as one great stream have a length of 4,200 miles, the longest in the world.

The Arkansas River is the third in size of the affluents of the Mississippi River, rising in the middle of the Rocky Mountains in central Colorado and draining a large watershed area in Kansas, Oklahoma, Indian Territory, and Arkansas. Its length is 1,514 miles and it carries

to the Mississippi River a volume of nearly six billion cubic feet of water a day. The Red River of the South rises in the southern end of the Rocky Mountains in northern New Mexico, flows across the panhandle of Texas, the southern portion of Oklahoma and Indian Territories, and through Louisiana, joining the great river near its mouth. Its length is 1,200 miles and its average daily discharge is five billion cubic feet. These volumes of discharge represent a vast amount of water going to waste, much of which in the western portion of the Purchase will eventually be husbanded for irrigation.

The rivers of the Great Plains present many interesting problems for students of physiography. They are not all of the same age and present many features of diversity. Some of those which rise in the high mountains to the west bear a heavy load of sediments, especially during freshets, which they can only carry in the regions of greater declivity, and as their velocity diminishes in the Plains eastward, they deposit a portion of their burden. In this way the Platte is filling up its present trough, especially in eastern Colorado and through Nebraska. The Arkansas and portions of the lower Mississippi present similar conditions of overloading and deposition. For several hundred miles in its lower portion the Mississippi flows on an embankment which it has built up ten to twenty feet above the adjoining lowlands.

FIG. 7. *The North Platte River at the Nebraska-Wyoming state line, looking down stream, showing shrunken condition of the river in mid-summer.*

In North Dakota and South Dakota the Missouri River has a relatively new course, the waters having originally flowed down the James River Valley. During the Glacial Period, the river was displaced from this valley by the advance of the continental ice sheet along the western margin of which the outlines of the present course were incised. The new valley was cut so deep during this period that, when the ice retreated, the old channel could not be regained and the river has remained in its new valley, cutting it down gradually to its present level. One of the most striking contrasts between an overloaded and an eroding stream is in southern Nebraska, where the Platte is filling up its valley and its neighbor on the south, the Republican, a branch of the Kansas, is deepening its valley. This is due to the fact that the Platte is overloaded with sediments from the mountains, while the Republican, fed by springs in eastern Colorado, receives relatively little sediment, besides having a slightly greater mean declivity, so that erosion preponderates over sedimentation.

Climate. The Louisiana Purchase region presents a general regularity in its variations in climate from north to south and east to west. This is most marked in the annual precipitation. At the southern extremity of the region, the mean annual rainfall is slightly over sixty inches and this amount diminishes gradually to the northwest to less than fifteen inches in the Great Plains of Eastern Colorado, Wyoming, and Montana. On the Rocky Mountains, Bighorn Mountains, and Black Hills there is locally increased precipitation to from twenty to thirty inches a year, due to the influence of these highlands in arresting moisture passing across the Continent.

In thermometric range there is a regular diminution of mean annual temperature to the north. In southern Louisiana the mean is slightly over 70°. In Arkansas it is 57° to 65° and then the diminution is regular to considerably below 40° in the northern portion of North Dakota and on the high mountain summits to the west.

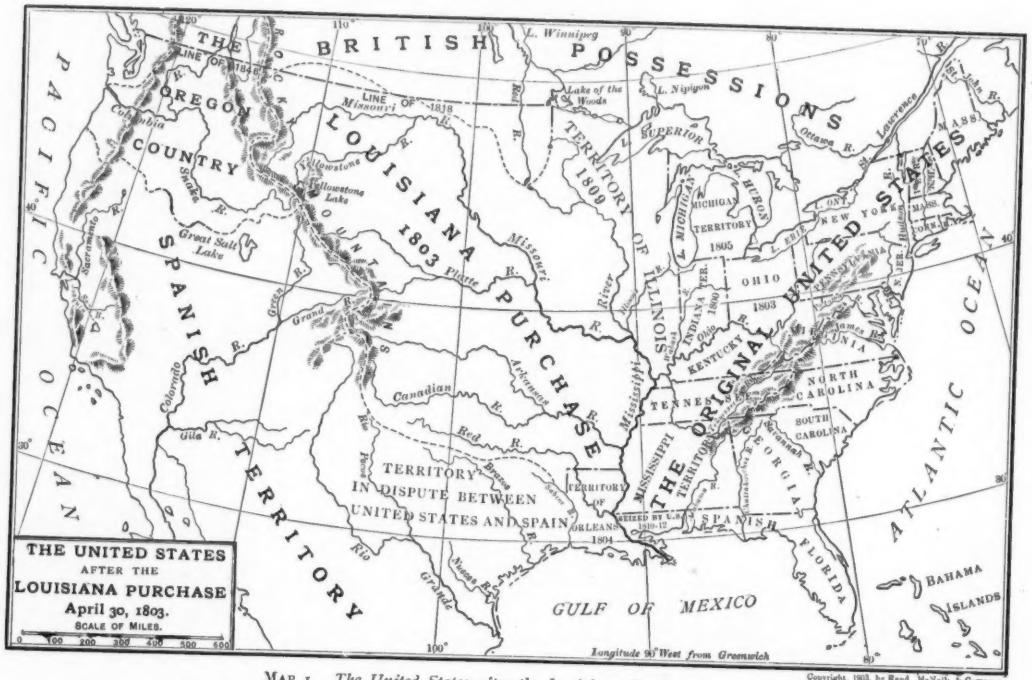
EXPLORATIONS WITHIN THE LOUISIANA PURCHASE

BY A. C. HOWLAND
Instructor in History, Teachers College, New York City

AT the time of the formal cession of Louisiana by France, in December, 1803, little was known of this immense territory, although for two centuries it had been alternately in the formal possession of two countries whose explorers have been among the most intrepid in history. Since Coronado's ill-fated expedition, however, no stories of gold mines had tempted the Spaniards in this direction, while the character of the country was ill-suited to French enterprise. The Rocky Mountains, with their much desired furs, were separated from the Mississippi by great stretches of prairie, traversed only at wide intervals by streams, and these were for the most part navigable only for a short time each year. The one river that gave access at all times to the mountains was the Misssouri, and this, owing to its great sweep to the north, necessitated a journey of over 2,000 miles before the mountains were reached. The French pushed their posts some distance to the west of Lake Superior and one explorer and trader, Vérendrye, penetrated southwest through the country of the Sioux to within sight of the Bighorn Range of the Rockies, in 1743, but farther than this the French did not go.

Along the Pacific Coast of what was afterwards to be the United States, somewhat more progress had been made in discovery by the close of the eighteenth century. Drake had skirted its shores as far north as Oregon during his famous circumnavigation of the globe. In 1602 the Spaniard Vizcaino reached Monterey Bay, but that remained for more than a century and a half the limit of enterprise in this quarter for fear that further knowledge would open up across the northern continent a trade route for Spain's rivals in the eastern trade. Finally, about 1775, the news of Russian activity in the northern Pacific caused Juan Perez and others to push their explorations as far up as the 58th parallel, although these voyages were so perfunctory that the existence of the mighty Columbia River was only guessed at from the current in the ocean off its mouth. Meanwhile the Spaniards obtained a knowledge of California from the work of the Franciscans, who established missions among its Indians between 1769 and 1776.

XUM



MAP 1. *The United States after the Louisiana Purchase.*

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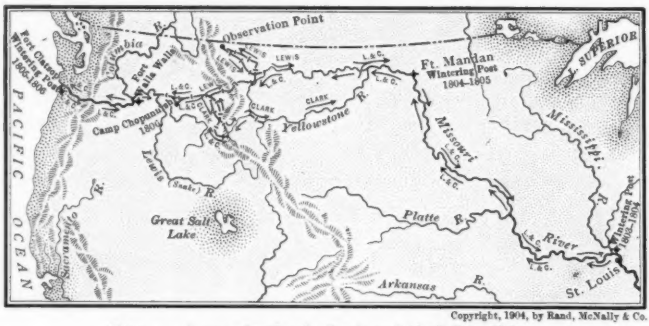
It is, however, to the fur traders that we owe the first real information relative to this northwest country. The Hudson Bay Company and its later Montreal rival, the Northwest Company, founded in 1783, sent their agents farther and farther into the interior until at last a devoted employee of the latter, Mackenzie, succeeded in penetrating the northern Rockies and reaching the Pacific in the summer of 1793. Ten years before this, English and American vessels had begun to appear upon this coast seeking cargoes of furs which were taken usually to China. For a time the Spanish tried to prohibit this trade and even seized some of the vessels engaged in it, but in 1795 they agreed to abandon practically all of their claims north of the Columbia River. It was not long before the American vessels commanded most of this commerce, since the monopoly enjoyed by the British East India Company in India and China put other English merchants at a disadvantage as compared to foreigners. Among the Americans engaged in the traffic for furs was Capt. Robert Gray of Boston, in command of the ship Columbia. In May, 1792, he entered the mouth of the great river to which he gave the name of his vessel and which he seems to have been the first civilized man to discover, notwithstanding the many previous visits of sailors to this coast. His claims have been disputed in behalf of Spanish and English navigators, but apparently without good grounds.

For twenty years before the purchase of Louisiana, Jefferson had taken a keen interest in the land west of the Mississippi, and on three different occasions he made proposals looking to its exploration. In 1783, he laid a proposition to this effect before Gen. George Rogers Clark; later, while minister to France, he pursuaded an American, John Ledyard, who had accompanied Captain Cook on his last voyage in the Pacific, to penetrate the Oregon country from the west by way of Russia. Ledyard undertook the task and actually succeeded in reaching the region of Kamschatka, before being turned back by the Russian government. In 1793, the American Philosophical Society of Philadelphia, persuaded thereto by Jefferson, commissioned a French botanist named Michaux to lead an exploring expedition to the Rockies, but he became involved in the Genet conspiracy against the Spanish possessions in America and nothing came of the project. It will thus be seen that when Louisiana came into the possession of the United States, nothing was known to the world of its immense interior save scattered bits of imformation in possession of the wandering traders of the British fur companies. Even before the transfer from French

to American authority was made, Jefferson, now in a position to give effect to his earlier plans, organized an expedition to explore the country, and early in 1803 obtained from Congress the necessary authority and an appropriation of money. His objects were varied. Primarily the expedition was to seek for the best practicable route for commerce from the Mississippi Valley to the Oregon coast. At the same time the nature of the country was to be determined, its soil and productions, the plant and animal life, the course of the streams, the mineral productions, and the Indian inhabitants and their characteristics.

In selecting leaders for the exploring party, Jefferson exercised great judgment. He chose two young men, Virginians and originally



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MAP 2. *A map showing the Lewis and Clark Expedition.*
(From Mace's History of the United States.)

neighbors of his own, Capt. Meriwether Lewis, his private secretary, and Capt. William Clark, brother of Gen. George Rogers Clark, who had won the Illinois country from the British during the Revolution. They were accompanied by a party of thirty, including two French Canadian interpreters and an Indian squaw, wife of one of the latter. The winter of 1803–4 was spent in camp on the eastern bank of the Mississippi and in the following spring, May 14, 1804, the little expedition crossed the river and set out on their dangerous journey. Their plan was to proceed up the Missouri River to its source, there hide their boats, and then, passing over the mountains by the easiest trail, descend the Columbia to the ocean. This plan they carried out successfully. The journey up the Missouri was long and tedious. The current was swift and their canoes often were impeded by snags and sand bars. The banks frequently crumbled in or were covered by brush and bushes so that towing was almost impossible. They made frequent stops to hold councils with the Indians and distribute presents from

the Great Father in Washington, now heard of for the first time by most of these savages. Finally after nearly six months of weary labor they reached at the end of October the villages of the Mandan Indians, situated 1,600 miles from the mouth of the river, near the present Bismarck, North Dakota. These Indians, whose peculiar characteristics differentiated them from all other natives of the northwest, proved on the whole very friendly, and here Lewis and Clark passed the following winter.

On the approach of spring the expedition once more set out. Working their way slowly and with difficulty up the Missouri, they reached the mouth of the Yellowstone, April 26th, and on June 3d the Marias River, which is so considerable a tributary that the travelers were in doubt which was the main stream of the Missouri and cast about for some time making careful measurements before deciding. It was a matter of much importance, for the wrong course would have taken them far away from their true objective, the nearest branches of the Columbia. Finally, against the judgment of the majority of the party, Lewis and Clark decided to take the more southerly stream, which proved the correct one. On the 13th of June they came to the falls of the Missouri. Here they had to make their first portage of eighteen miles, which consumed some time and required great labor on the part of the whole party. It was not till July 25th that they reached the second forks of the river where the same decision confronted them as before. There were three streams to choose from, but they rightly selected the northern one, naming the other two Madison and Gallatin after the Secretary of State and the Secretary of the Treasury.

The party were now well within the mountains and it became necessary to find and make friends with some of the Indians of the region who might guide them across the divide to the headwaters of the Columbia. The Indian woman of the party, squaw of one of the interpreters, was fortunately a native of this district, having been captured by one of the enemies of her tribe some years before and sold into the lower country. By her aid the explorers soon met a party of Shoshones and persuaded them to show the way through the pass. They came out on the Lemhi River, a tributary to the Salmon which flows into the Snake River and thence into the Columbia, so that the course of the explorers seemed clear before them. But as a matter of fact, they had arrived at the most difficult part of their journey. The Lemhi and Salmon rivers proved impracticable and they were forced to abandon them and strike off to the north over an almost impassable

trail leading through the Bitter Root Mountains along the great continental divide. Game became scarce and they almost starved, being forced to kill and eat some of the horses they had procured from the Indians. From August 30th to Septemper 20th, they struggled through these mountains, but finally emerged in the valley of the Clearwater, where they encountered a band of Nez Percé Indians from whom they procured food and further imformation as to the way. They built and launched canoes on the Clearwater and paddling down this and the Snake River at last reached the Columbia on October 16th. Notwithstanding the dangerous rapids of this river, they passed safely through in their boats and on November 7, 1805, came out on the shores of the Pacific.

The winter was passed here in camp near the mouth of the Columbia, and the following spring the party set out on the return trip across the mountains. On their way back they discovered the Willamette River, which had escaped their notice on the descent, owing to the islands at its mouth, and then retraced their steps to their old camp among the Nez Percés, on the Clearwater. Obtaining guides here, they plunged into the intricacies of the Bitter Root Mountains, and on the 1st of July found themselves at a point near the mouth of Travelers Rest Creek, where the party was divided into three sections in order to find if possible an easier route through the mountains than the one they had followed coming out. Lewis was to proceed by the shortest trails to the falls of the Missouri and explore Marias River while waiting for his companions to come up. Another party was to follow the old route to the headwaters of the Missouri and, collecting the stores left there, join Lewis at the falls. Clark was to accompany these men to the three forks of the Missouri and then ascend the Gallatin River, pass over to the head of the Yellowstone, and follow this down to its junction with the main stream. All these plans was successfully carried out and after many adventures with Indians, grizzly bears, and buffalo, as well as dangers incident to the wild country through which they travelled, the entire party was once more united on the 12th of August, a short distance below the mouth of the Yellowstone. Two days later they came to the Mandan villages where they had spent their first winter and on the 23d of September, 1806, reached St. Louis after an absence of nearly two years and a half.

One of the members of the Lewis and Clark expedition, John Colter, had turned back before reaching St. Louis and joined a party of trappers. He spent several years in the mountains and in the winter of 1807

he crossed what is now the Yellowstone National Park, the first white man to behold the wonders of that region.

While the way to the Pacific was being blazed, another officer of Captain Lewis' regiment, Lieutenant Pike, was associating his name with the Louisiana Purchase. In 1805 he was sent to explore the headwaters of the Mississippi, where he made careful observations and supposed he had found the source of the river in Leech Lake. The following year he was sent with a party to discover the headwaters of the Arkansas River. Leaving St. Louis he traveled overland through

Drawn from an old print by H. W. Colby.

FIG. 1. *The city of St. Louis in the early fur-trading days*

Kansas, turned south to the Arkansas, and then pushed on into Colorado, where he discovered the famous mountain peak that bears his name. In endeavoring to reach the head of Red River he came upon the upper waters of the Rio Grande and trespassing on Spanish territory was arrested, and taken to Mexico, whence he was later sent back to the United States.

The Lewis and Clark expedition and the explorations of Pike led to the establishment of two trade routes through the western part of the continent known as the Oregon trail and the Santa Fé trail. The former owed its existence to John Jacob Astor, who established a fur company to operate on the Pacific Coast and sent out an expedition in 1811 under W. P. Hunt, to establish posts along the route followed in 1804–6. Instead of following the great bend of the Missouri so far to the north, however, Hunt turned west some 1,300 miles from its mouth and passed by way of the Black Hills and Green River

through the mountains and thence to the Columbia. The War of 1812, however, broke up Astor's trading post on the Pacific and when the route was reopened, a somewhat different course was followed still farther to the south. Commercially the Santa Fé trail was more important than the Oregon. The year after Pike's expedition the first trading journey was made from the Mississippi to New Mexico, but the real history of the trail begins with the trading operations of William Becknell, shortly after 1812. From that time to the introduction of railroads the Santa Fé trail was the most important land route in America.

The road over the mountains followed by the Astorians was not satisfactory, and in 1819 the government sent out Major Long to search near the sources of the Platte River for a more southern pass through the mountains. In this he failed through following the South Branch of the Platte instead of the North. He made many important discoveries, however, within the state of Colorado, including Long's Peak, and explored the canyon of the Arkansas. His journey had pointed to the valley of the Platte as the shortest route to the mountains and it was but a few years before the Great South Pass in Wyoming was discovered, it is said by Alexander Henry, a Canadian fur trader, in 1823. Through this pass afterwards ran both the Oregon trail and the Overland trail to California.

In the third and fourth decades of the century the fur traders contributed most to the history of exploration within the Louisiana Purchase. Gen. W. H. Ashley of St. Louis organized the Rocky Mountain Fur Company in 1822, and established many trading posts. He led several expeditions into the interior, explored the Green River near South Pass, and visited Great Salt Lake, which had already been discovered by the famous guide and trapper, James Bridger. Another trader was Nathaniel J. Wyeth, who led two expeditions to the Columbia in 1832 and 1834, and did much to attract the attention of the East to the Oregon country and thus lead to its occupation by American emigrants. Captain Bonneville, U. S. A., was also interested in the fur trade and traveled much through the Rockies from 1832 to 1835. He crossed over into California by way of Great Salt Lake and is said to have discovered the Humboldt and San Joaquin rivers, although he was preceded in the overland journey to California by a St. Louis fur trader named Pattie, who is supposed to have been the first white man to cross the continent in this direction.

During this period a number of scientific men added to our knowl-

edge of these parts. Among them may be mentioned Bradbury, the naturalist, Nuttall, the botanist, Townsend, an ornithologist, Nicollet, a French astronomer and geographer, and Maximilian, Prince of Neuweid, a German naturalist. Nor should Schoolcraft's excellent descriptions of the Indians of this region and Catlin's Indian portraits be forgotten.

In 1843 began the great emigration to the Columbia country. In that year about a thousand people followed the Oregon trail to the Pacific Coast, and thereafter for a number of years the exodus steadily increased. It was important that fuller information regarding the routes of travel across the mountains should be obtained and laid before the country and therefore the government determined to undertake an official exploration. At the head of the expedition was placed Lieut. J. C. Fremont, son-in-law of Senator Benton of Missouri. Fremont's work was of great importance in opening up the Rocky Mountain country for travel, and from the passes he discovered and the number of routes he demonstrated to be practicable he became known throughout the country as the "Pathfinder." His first expedition, undertaken in 1842, led him to South Pass and the Wind River Mountains in western Wyoming. The second, in 1843–4, took him first into Colorado where he found a new pass through the mountains, and then north through the basin of Great Salt Lake and on to the Columbia. All this region he carefully mapped out and then, after resting for a short time in Oregon, proceeded south through an entirely unknown country, into the Sacramento Valley of California. He returned by way of the Utah basin. In 1845 Fremont again started out, this time to find the best route for a railroad to San Francisco, then a Mexican town. Shortly after reaching the coast news came of the outbreak of war and he led a successful revolt of American settlers against the Mexican authorities. Two more exploring expeditions were organized by Fremont, one in 1848 in which he discovered a practicable route along the upper Rio Grande to the coast, and the other in 1853 when he opened new passes through the mountains between the 38th and 39th degrees.

In 1849 began the stampede for the California gold fields and thereafter all energies were turned for some years to a quest for the precious metals. The mountains were penetrated in every direction by the gold diggers, and the demand arose for railroad lines across the continent. Subsequent exploring expeditions were mainly confined to railroad surveys, among which may be mentioned the government

surveys of I. I. Stevens, in 1853–4, from St. Paul to Puget Sound, now largely followed by the Northern Pacific; of Lieutenant Beckwith, in 1854, through the region of the South Pass, the route of the Union Pacific; and of Lieut. John Pope, in 1854, along the line subsequently followed by the Southern Pacific. Besides these there were many surveys undertaken both by the government and private corporations in the Rocky Mountain region between 1850 and 1860.

PRESENT INDUSTRIES WITHIN THE LOUISIANA PURCHASE*

BY SPENCER TROTTER

Professor of Biology, Swarthmore College, Pennsylvania. Author of the "Geography of Commerce"

INDUSTRIAL *Development of the Region.* The eastern border of the Louisiana Purchase was, during the first half of the nineteenth century the western frontier of settlement. The vast expanse of rolling, grass-covered "plains" that stretched away westward from the frontier to the Rocky Mountains was the then little known "Indian Country" and the pasture land of the great bison herds. The first commerce of the region was in the hands of Rocky Mountain trappers and the traders of the Santa Fé trail and the Missouri. Pelts were the earliest commodity, and St. Louis, from its location on the Mississippi-Missouri waterway, was the focal point of this trade. St. Louis was the gateway to the "Far West" as Pittsburg was to the Ohio traffic and Buffalo to the Lake Region. Here expeditions fitted out for the long traverse of the "plains" and the wharves, piled high with goods, were lined with the flat-bottomed steamboats of the Missouri navigation and the larger craft of the Mississippi. Parkman gives a vivid picture of St. Louis trade in the summer of 1846.

The trapper and the trader were essentially a part of the Indian life of the Great Plains and gradually disappeared as the frontier moved farther westward. The fertile prairie lands of more abundant rainfall in the area now embraced by Missouri, Iowa, and the eastern parts of Kansas and Nebraska were rapidly settled as the danger from Indians grew less, and the great farms of corn-land spread to the borders of the arid plains. To the north, in western Minnesota and the Dakotas, the wheat was advancing westward. The Coastal Plain

*The statistical diagrams that appear in this article are from Dodge's Advanced Geography, and are used by special arrangement with the author and the publishers.

and its upland borders in Louisiana and Arkansas was a cotton-growing country with river facilities for shipment of the crop to the port of New Orleans. The western extension of the railroads gave further impetus to settlement and trade. In the decade from 1870 to 1880 the last traces of the picturesque frontier period vanished from these prairie lands which had become the home of an agricultural people.

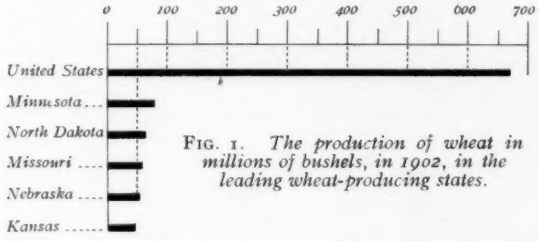

FIG. 1. *The production of wheat in millions of bushels, in 1902, in the leading wheat-producing states.*

The deficient rainfall over the Great Plains determined an industry essentially pastoral and nomadic in character. While scattered bands of Indians still pursued the rapidly dwindling herds of buffalos, the cattlemen invaded these hunting grounds and pastured their droves of "long horns" on the wiry buffalo grass. Then followed the years of the cowboy, the range, and the round-up and the establishment of ranch life from end to end of the region. With cattle came sheep and, as the railroads reached out, wool became an item of growing importance.

The industries of the area embraced by the Louisiana Purchase are essentially agricultural, although considerable mining is done in certain localities, notably that of lead and zinc in the Mississippi Valley, and

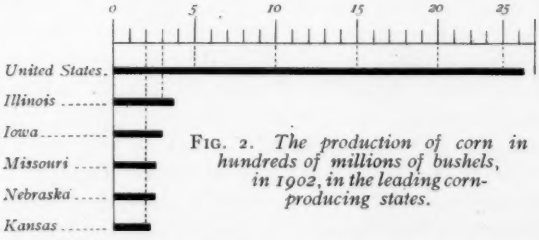

FIG. 2. *The production of corn in hundreds of millions of bushels, in 1902, in the leading corn-producing states.*

the mining operations of the Black Hills district of South Dakota. Crop growing and stock raising and the industries dependent thereon are the leading features of the region.

Some notable facts are available which indicate the vast importance

of this area in relation to national growth. That the westward expansion of population found an abundant opportunity in this fertile land is well illustrated by the increase of farms in several states during the decade from 1870 to 1880. Thus in Iowa the percentage of increase of the total number of farms was 59.4%; in Missouri, 45.3%; in Dakota, (then one State) 913.7%; in Nebraska, 415.3%; and in Kansas, 262.7%.*

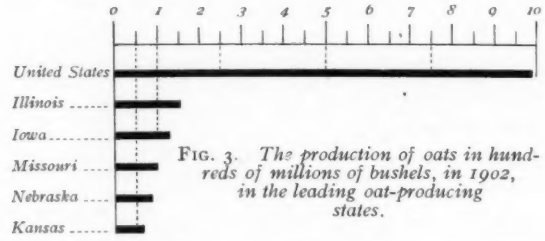

FIG. 3. *The production of oats in hundreds of millions of bushels, in 1902, in the leading oat-producing states.*

An equally significant fact is seen in the westward movement of wheat cultivation, the center of which at present is in southwestern Iowa, having advanced to the Missouri River from a point just east of the Mississippi within the past twenty years. In 1850 the greatest wheat-producing area was in the Genessee Valley, in New York State. In the last decade (1890–1900) the movement has been up the Missouri, under the influence of the rapidly increasing growth of the hard-grained wheat production and the milling industries of the Dakotas and Minnesota. The center of corn production to-day is in southwestern Illinois, just above the junction of the Missouri and Mississippi rivers and not far from St. Louis. The center has shifted scarcely at all in the last decade, owing undoubtedly to two facts—(1) the unavailability of land for corn growing to the west of the 100th meridian due to increasing aridity, and north of the parallel of 42° north, due to increasingly low temperature, and (2) the centrallizing of the live stock industries (fattening of cattle and hogs, meat-producing, etc.) on the Missouri and at Chicago. This second factor is due largely to transportation facilities. Although the corn center has not advanced to within the limits of the Louisiana Purchase its present position close to the eastern border of that area is in large part the result of the immense territory of grazing land to the west, the live stock of which is shipped east to fatten on the farms of the corn belt.

In reviewing the present industrial features of the territory embraced

* Tenth Census.

by the Louisiana Purchase the predominant industries will be considered from the standpoint of the several commodities which form their basis. The commodities may be grouped under three main heads—(1) *Crops* (including corn, wheat, and other cereals, forage crops, cotton, and crops of minor importance); (2) *Live Stock* (including cattle, hogs, and sheep, and the meat-packing industry and wool); (3) *Mineral Resources* and *Mining Operations.*

Crops. Iowa produced 14.4% of the total United States production of corn for the year 1899; Kansas produced 8.6%; Nebraska 7.9%; and Missouri 7.8% of the total. All other corn-growing states, with the exception of Illinois, rank below these four which are included within the domain of the Louisiana Purchase. The yield per square mile throughout the greater part of these states was over 3,200 bushels, as high as in any part of the corn belt. A large proportion of the corn grown in this area is fed to stock, the amount varying with the greater or less demand for meat products. Another considerable portion finds its way to the distilleries at Peoria, Ill. Still another portion enters into starch and glucose manufacture, and a fourth considerable portion into domestic economy. A comparatively small amount finds its way into the export trade of the country.

The wheat-growing area reaches much farther to the northwest than that of corn, as a result of the lower temperature relations of the former cereal. The Twelfth Census reports that four-fifths of all the farms in Minnesota during 1899 produced wheat. South Dakota

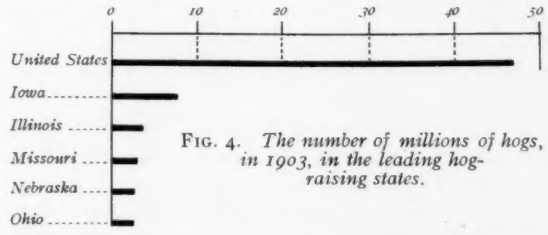

FIG. 4. *The number of millions of hogs, in 1903, in the leading hog-raising states.*

came second with nearly the same proportion, and North Dakota third with almost three-fourths. These three states are in the Spring Wheat area. The Census of 1900 reports Minnesota as contributing 14.5% of the total wheat production of the country, over 5% more than any other wheat-growing State. The great milling industry of the upper Mississippi is a direct result of the expansion of the

wheat-growing area in the Northwest and the demands of the mills even overreach the vast supply from the contiguous United States territory and draw wheat from the harvests of Canada and from Washington and Oregon.

Other cereals are grown in this eastern area of the Louisiana Purchase, but to a small extent compared with corn and wheat. Wheat creates an enormous traffic movement from its areas of production

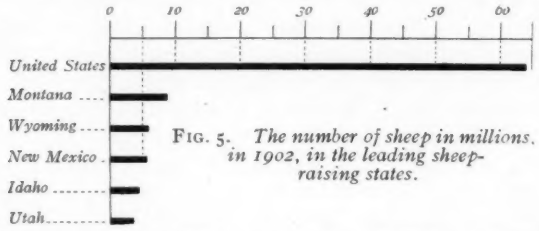

FIG. 5. *The number of sheep in millions, in 1902, in the leading sheep-raising states.*

to the mills and to the disbursing points of Duluth, Superior, and Chicago, and forms a very large proportion of the whole export trade of the country (breadstuffs, of which wheat and wheat flour form the major portion, constitute 20% of the total export value of the United States, being second only to cotton).

In the low-lying coastal lands of the state of Louisiana the sugar cane has long been an important crop. Louisiana is practically the only state producing the cane, its output of sugar for 1901–1902 amounting to 275,000 long tons. The production of sugar beets has developed as an important industry in Nebraska and Colorado, where several large factories are located. The more important centers of beet sugar production, however, lie outside of the Louisiana Purchase area, in California and in Michigan.

Cotton, the largest item in the export trade of the United States (22% in the raw and unmanufactured state), is grown to a considerable extent within the southern area of the Louisiana Purchase. The entire State of Louisiana, the greater part of Arkansas, Indian Territory, and a portion of Oklahoma are all cotton-producing areas of more or less importance. Of the total increase of cotton acreage in the last decade, Indian Territory and Oklahoma, together with Texas, contributed 88.7%, each of the former two adding 371,987 and 239,569 acres respectively to the entire cotton-growing area of the country.*

* Twelfth Census.

The hay crop of the country outside of New York State, which led in the last decade, is contributed largely by Iowa, Kansas, and Missouri. The two former states produced 4,649,378 and 4,337,342 tons each; while Missouri and Nebraska each produced over 2,000,000 tons, with Pennsylvania, Indiana, and Illinois as their only rivals above this figure.

Live Stock. The dry character of the high "plains" has precluded crop growing on any large scale, save where irrigation has been established, and has made this western area of the Louisiana Purchase preëminently a group of "range states." Montana, Wyoming, and Colorado are the great ranch states of the section that lies within the limits of the Purchase. Notwithstanding the great ranges, the character of the pasturage is against fattening for market purposes. As a consequence a large number of cattle are shipped into the western corn-belt section along the Missouri River and, apart from Texas, which is the greatest cattle state in the Union, Iowa, Kansas, and Nebraska report the largest numbers, over five million, four million, and three million head respectively. Iowa, also, stood second in the number of dairy cows, being exceeded by New York.

On the other hand sheep thrive well on the dry pasturage of the high "plains" and foothills. Montana and Wyoming led all other states in the number of sheep, each contributing over 4,000,000 head,

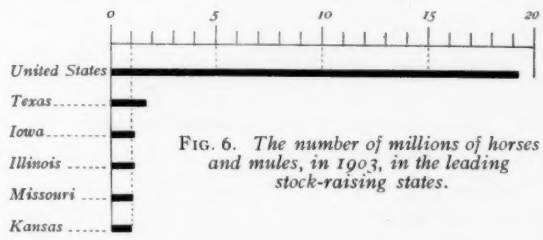

FIG. 6. *The number of millions of horses and mules, in 1903, in the leading stock-raising states.*

and Colorado over 2,000,000 head, out of a total of over 61,000,000 head for the entire country. Most of the wool produced in the United States is used in domestic manufacture.

Iowa, Missouri, Nebraska, and Kansas, together with Indiana and Illinois, raise nearly two-thirds of all the swine produced in the country, Iowa ranking first as a hog-producing state with 15.5% of the entire number.

The centralizing of cattle, hogs, and sheep in the western portion

of the corn belt, as a result of the enormous food supply raised there, has given rise to an immense meat-packing industry. This industry, outside of Chicago, is chiefly centered along the Missouri River at St. Louis, Kansas City, Omaha, and St. Joseph. At these five centers the rate of concentration of live stock for one week during the year 1900 reached the enormous figure of 844,000 head (cattle, sheep, and hogs).

Mineral Industries. Mining has been an important factor in the industrial development of the Louisiana Purchase, notably in the Cordilleran Mountain region, in the Black Hills, and in certain localities in the Mississippi Valley. The smelting of metallic ores is a prominent feature throughout the mining districts.

Colorado is the only state that produces iron in any quantities, though Iowa adds a small percentage of brown hematite ore to the total United States product. The iron ore mined in the vicinity of Leadville, Colo., on the western border of the Purchase, contains varying amounts of manganese which is used in the manufacture of spiegeleisen and as a flux in the silver smelters. The steel industry is being rapidly developed in Colorado with a consequent increasing demand for the manganiferous ores.

Montana leads in copper, with the enormous total of 270,738,489 pounds (1900) representing 44.7% of the entire United States product. Montana, Wyoming, Colorado, and South Dakota are all gold and silver producing states. Colorado's gold output increased $2,846,600 for the year 1900, while South Dakota increased its silver output for

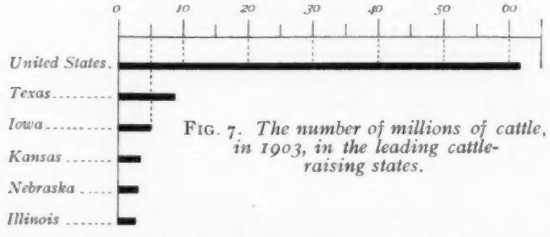

FIG. 7. *The number of millions of cattle, in 1903, in the leading cattle-raising states.*

the same year $390,600. Important lead and zinc centers occur in southeastern Missouri, in the Joplin-Galena district of Missouri and Kansas, and, locally, in the Dubuque district of Iowa. Lithia ore is mined in the Black Hills, South Dakota. The only United States locality where nickel and cobalt are at present mined is the Mine Lamotte, Missouri. Some antimony ore is mined in South Dakota (Black Hills) and tin ore (cassiterite) is mined to a limited extent in the same region.

Vast areas of coal exist in parts of the Louisiana Purchase; a strip of 98,000 square miles extends, in detached fields, from Iowa to the Mexican border. Petroleum occurs in Colorado and some asphaltum in the bituminous limestones of Indian Territory. Missouri ranks high as a producer of building stones, and Arkansas is a noted center for the production of oil stones of fine grain.

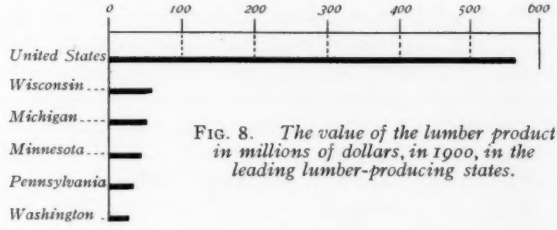

FIG. 8. *The value of the lumber product in millions of dollars, in 1900, in the leading lumber-producing states.*

Concluding Remarks. From this very brief review of the leading industrial features within the area of the Louisiana Purchase it is evident that the region is preëminently the great food-producing section of our national domain. No other area within our boundaries could supply the live stock and the grain that this region supplies to-day. Its effect on national growth and the development of the people has been most remarkable. Without this contiguous western area as an outlet to a growing population the conditions east of the Mississippi must have remained for a long time cramped and undeveloped. If the area had continued in the possession of a foreign power, our record as a people would have been written small upon the pages of history, even though we had acquired the Pacific Slope. The astuteness and foresight of Jefferson and the statesmen of his time cannot be overestimated. More than the mere question of wealth, the effect of this land upon the character of the people has been far-reaching. Within the past thirty years it has become the home of an industrial population that has helped to weld the land into one great national unit. As we stand to-day gazing out over the immense vistas of waving corn and wheat and beyond to the vast cattle ranches, and see the long trains moving the wealth of this land to the consuming and disbursing cities; as we view the manifold inventions that gather in the harvest of the prairies, and hear the hum of industry from hundreds of towns with their thousands of pleasant homes, we catch the sure note of progress—the sign of a virile people that has responded to the opportunities of its environment.

THE VALUE AND DEVELOPMENT OF IRRIGATION IN LOUISIANA PURCHASE TRACT

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DRAW a line from the Canadian border to Texas along the one-hundredth meridian and you will have approximately the boundary between the arid and humid regions of the United States. This line will pass through North and South Dakota, Nebraska, Kansas, Oklahoma, and strike the panhandle of Texas. Eastward the rainfall amounts to twenty inches annually and over; westward to twenty inches annually and less. Of course the location of this line is not absolutely fixed, it swings back and forth with seasons of increased or diminished precipitation. It is, indeed, rather a belt on which there are years of rain and years of drought. The belt can hardly be called arid, it is certainly not humid, so for convenience it is known as the semiarid tract.

This imaginary division, however, is a real boundary. West of it dry farming, that is farming without irrigation, as practised in humid climates, can not be carried on, and nature has here set a barrier more absolute than any sea or mountain. The cause of this peculiar condition, as already indicated, is found in the difference in rainfall. Twenty inches annually is the least amount suitable for farming under ordinary conditions. When the precipitation becomes less, artificial means of increasing it must be resorted to and farming is conditioned wholly by the amount of water which can be controlled from streams and underground sources. Thus the territory of the original Louisiana Purchase is divided into two distinct regions agriculturally, one moist and the other dry. On the one hand the rich prairies of Iowa, eastern Kansas, Nebraska, and Minnesota offer the acme of fertility and produce with a minimum of labor the wonderful grain crops which have added so much to the wealth of our country; on the other hand the dry and parched stretches of the high plains in western Kansas, Nebraska, the Dakotas, and Montana, and the equally dry but fertile valleys of Colorado and Wyoming demand the utmost care and vigilance and large outlays of money in engineering works to supply the natural deficiency of rainfall. And yet, when the proper conditions are met in the arid section, that is, when sufficient water is provided, the fruits

and vegetables, as well as the grains which reward the patient tiller of the soil, are the wonder of the farmers of the East.

My purpose is to outline briefly the more important aspects of the value and development of irrigation in the arid and semiarid Louisiana Purchase tract and show how regions practically worthless so far as farm values are concerned, without water, have become in many places veritable garden spots by the intelligent application of the water other than that from direct rainfall. To do this, attention will be called to a number of problems which characterize the irrigation movement in different sections of this area, a region so diverse in physical characteristics.

FIG. 1. *Town well, Woonsocket, South Dakota; 725 feet deep; yields 1,150 gallons per minute; is throwing a stream 97 feet, under a pressure of 130 pounds per square inch.*

THE FLOWING WELLS OF THE DAKOTAS

Although the natural rainfall in North and South Dakota comes perilously near the twenty-inch mark and even falls beneath it in the western portions, nature has provided for certain sections of this state a seemingly inexhaustible supply of water as a substitute. This water is contained in a series of rock strata known as the Dakota sandstones, which underlie the entire area of these states. The Dakota sandstones are a series of soft and porous strata which are capable of containing a large percentage of their weight in water. The great uplift which produced the backbone of the Rocky Mountain chain and also the peculiar crustal blister known as the Black Hills raised this series with others and brought them to the surface high up on the eastern flanks of the Rockies as well as on the sides of the Black Hills uplift. The streams from these upland areas flow across the upturned edges of the Dakota sandstones and a very considerable portion of their waters is absorbed by the porous rock. It passes by slow percolation down under the Great Plains states, sinking with the strata many hundred feet, and obtaining in this way an enormous head or pressure. The rock is not accessible from all portions of the Plains because the overlying material is too thick to be penetrated by wells at economical cost, but through central North and South Dakota,

especially along the greater river valleys where the streams have cut into and carried away a portion of the surface, wells have been successfully driven and reach the water-bearing beds at depths of from one to two thousand feet. The result of striking water is most interesting. A true artesian flow is reached, and the water, impelled by the great head above referred to, is forced sometimes as high as ninety feet or more into the air. So great and constant is the pressure that the wells in the Dakotas have been used as a source of power for manufacturing purposes, the generation of electricity, and for numerous other uses of this nature. But especially important are these wells for domestic purposes and irrigation and considerable areas are annually cultivated by means of them. In 1899, over 5,000 acres were irrigated from wells in these states.

While the artesian supply is indeed phenomenal, it reaches only certain portions of the region and irrigation from the rivers is practised along the valleys, chiefly on pasture and wild hay lands. By water from all sources more than 4,800 acres were under irrigation in the Dakotas when the census was taken, in 1899, which showed the remarkable increase of 994 per cent in ten years for North Dakota and 177 per cent for South Dakota, while the value of the crops thus raised amounted to almost $236,000.

THE HIGH PLAINS OF KANSAS

Kansas is a frontier state, agriculturally speaking, for, while the eastern portion enjoys a rainfall sufficient for plentiful crops, its precipitation decreases steadily toward the west until, somewhat more than two-thirds of the distance to the Colorado line, the fatal twenty-inch zone is reached. To the west of this lies a region of magnificent fertility known as the High Plains, with conditions ideal for farming in level expanse of surface, deep loamy soil, and proximity to transcontinental railroad lines. A rich carpet of nutritious grass covers the land, promising yet more luxuriant stands of wheat and corn, and this, with other conditions found by earlier travelers and herdsmen, gave the impression that the region only awaited settlement to yield the phenomenal returns of the prairie lands lying nearer the Mississippi River.

No mistake could have been greater. In spite of the really unusual soil conditions, the region was found to be as treacherous to farming interests as many a desert valley in the admittedly arid states. Hence it has followed that the High Plains are associated with a most interesting chapter in the economic development of the West, and formed

the setting in the decade from about 1885 to 1895 of a veritable tragedy of settlement. The great fertility and apparently perfect conditions for farming tempted multitudes to settle and to endeavor to procure a livelihood through agricultural pursuits. Towns sprang up and communities were formed, and for a time there was partial prosperity. This was because there happened to be an unusual amount of rainfall. In many instances the profits were good and farmers enlarged

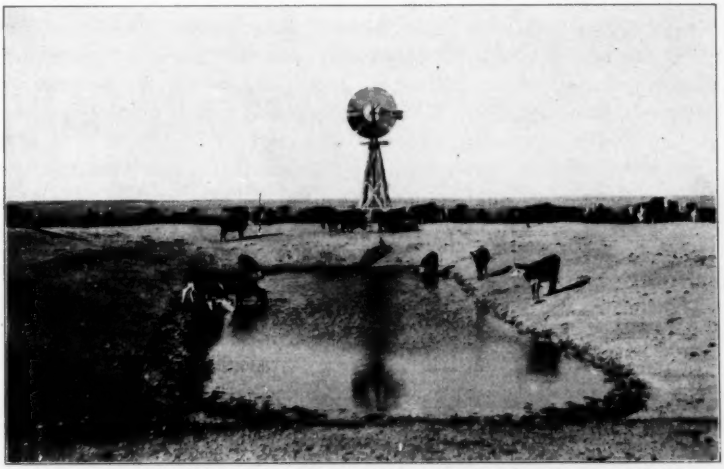

FIG. 2. *A small reservoir in western Kansas, fed by windmill, which makes it possible for large herds of cattle to live at great distances from a natural water supply.*

their acreage, built additional structures, and bought machinery for which purpose many of them mortgaged their property. For several years these conditions continued, the speculative side being fostered not a little by unscrupulous agents of real estate and banking companies who vied with each other in placing loans for money supplied by eastern capitalists. It was but a few years, however, before the period of excessive rainfall was followed by conditions more normal to the locality and the sweeping hand of misfortune fell upon the region. Many could not believe that the drought conditions would continue and mortgaged their farms more heavily to tide over what they thought would be a temporary dry spell, but, when year after year the crops withered away and large sums of money were lost, the population deserted the region as rapidly as it had come, leaving unharvested crops in the field, deserted houses on the farms, and often entire

towns depopulated. The High Plains to-day are dotted with the remains of this exodus. The settlement as made has been likened to an invasion; its sequel resembled a precipitate and disastrous retreat.

Since this time, an effort has been made to locate a water supply sufficient for the region, but thus far it has not been found. The land lies at too high an elevation above the river valleys for irrigation from them, even if there were a sufficient supply to be obtained from this source. On the other hand, no great underground supply has been found, so that it does not seem likely that any considerable area of the High Plains can ever be utilized for farming purposes. There is to be found a limited amount of water from shallow wells, and it may be possible to impound for use some of the spring rains in the numerous sinks and saucer-like depressions which pit the High Plains area.

But the prospects of western Kansas are not all dark. Considerable water in the aggregate may be secured from the shallow wells for purposes of stock and irrigation, which will make it possible to raise by intensive farming on small holdings enough produce to support a family and maintain a herd of cattle.

The future of the tract seems to lie in stock raising, unless crops capable of thriving under dry weather conditions are found.

Irrigation by means of water taken from the streams of the state is carried on to some extent. The Arkansas River has been the chief source of water supply for this purpose, and some of the early irrigating systems of the country drew their water from it. The physical peculiarities of the state make it rather difficult and expensive to conduct water from the rivers to the bench lands. The streams, often broad, have trenched their valleys far below the general level of the surrounding country, and, while large in the springtime, frequently dwindle to insignificant proportions or disappear altogether in the summer season. The census statistics, however, show that in 1899, 23,630 acres were under irrigation, an increase in ten years of 13.5 per cent, with a crop valuation of $226,453.

NEBRASKA, THE LAND OF WINDMILLS

The conditions existing in Nebraska closely resemble those of Kansas. In the east, the state is comparatively moist; in the west, it is dry; in its northwestern portion is found a waste of barren sand hills which almost completely defy cultivation on account of their shifting character. Like Kansas, Nebraska is a typical Great Plains State, a vast and nearly level region swept in the summer season by strong

and steady winds. These winds have been taken advantage of by the farmer and have become the source of not a little wealth by skillful management. The windmill, a device used to some extent with success in the East, is a necessity on the Plains. It is found in all the states of this region, but, as its development in Nebraska has become specialized and somewhat typical, it is particularly called to the attention in connection with this state. By it is made possible the profitable raising of stock, as well as the successful cultivation through irrigation, of many acres otherwise practically useless. By it, also, are frequently insured comforts and conveniences of the farmer's house, in

FIG. 3. *Raising sugar beets by irrigation in Nebraska. This now important western crop has been developed during the last ten years.*

the way of running water, found only in the city or the houses of the wealthy. The windmills are of every variety, but they may be briefly divided for our purposes into two distinct classes, the shop-made and home-made mills. Of course, the shop-made mill is more efficacious than the home-made, and the hundreds of them in use add greatly to the water supply of the plains, but the home-made device is of greater interest not only on account of its surprisingly high efficiency, but also from its low cost of construction and the interesting ingenuity employed in its manufacture. Frequently one runs across a mill pumping water for the use of all the cattle on the farm, providing the house with its supply, and furnishing a limited amount for irrigation the entire cost of which, to the farmer, was probably not more than three or four dollars, exclusive of the time it took to assemble the parts. Perhaps the low cost of the home-made windmill, as found on the Plains, is its greatest recommendation. It virtually has its birth from the scrap heap which is found on every farm and is composed

of such odds and ends as the sides of boxes, the chains and sprockets of old bicycles, discarded buggy axles, or other articles for which the ingenuity of the farmer finds a place in the strange ensemble.

These windmills are found scattered over the Great Plains in several distinct varieties. There are the Jumbo and the Baby Jumbo, which resemble the paddle wheel of a Mississippi steamer, the lower blades being protected from the wind by a box or otherwise. These mills are usually set facing in one direction and take advantage only of the prevailing wind. The Battle-ax is another variety of mill patterned more after the shop-made devices, with boards nailed to the end of revolving arms; and there are the Merry-go-rounds, Turbines, and other varieties, each individual likely to be of weird and surprising construction. But the remarkable fact which must not be lost sight of is that these homely devices, though crude enough in themselves, add a total benefit in the way of increased water supply to the Great Plains region far in excess of their cost, and form a positive means of agricultural advancement.

As in Kansas, the rivers in Nebraska lie in deep trenched valleys, making the irrigation of the bench lands difficult and expensive. The chief irrigated districts in Nebraska are located along the valley of the North Platte to its junction with the main stream, and also in the valley of the South Platte. A serious difficulty, however, to the increase in irrigation, especially along the South Platte, is that so much of the water is used in Colorado for irrigation purposes before it reaches the Nebraska line that, in the summer season, the stream in Nebraska is practically dry. The census reports show that in 1899 about 148,000 acres were under cultivation by irrigation, a remarkable increase of 1,164 per cent over the number cultivated in 1889. The value of the farm products raised by irrigation in 1899 was nearly $130,000.

COLORADO

The enormous mineral wealth of Colorado is the feature most prominent in the popular estimation of the state, and yet there is a larger acreage under cultivation by irrigation in Colorado than in any other state in the Union, California not excepted. In 1899 over 1,600,000 acres were irrigated—nearly 200,000 more than in California. The Colorado climate, however, favors the growth of cereals and forage crops and particularly vegetables, while that of California is peculiarly adapted to the growth of high-priced citrus fruits, so that the total value of the California irrigated product is somewhat greater than

that of Colorado. Nowhere in the country, however, except in Maine, are potatoes grown in such abundance or of such superior size and quality as in this state. The peaches of Canon City, raised by irrigation, are considered among the finest in flavor in the United States, and the watermelons, and particularly the cantaloupes grown near Rocky Ford, have a national reputation.

In the year 1859, Horace Greeley, while on his tour in Colorado, was greatly impressed by the idea that the lands lying to the east

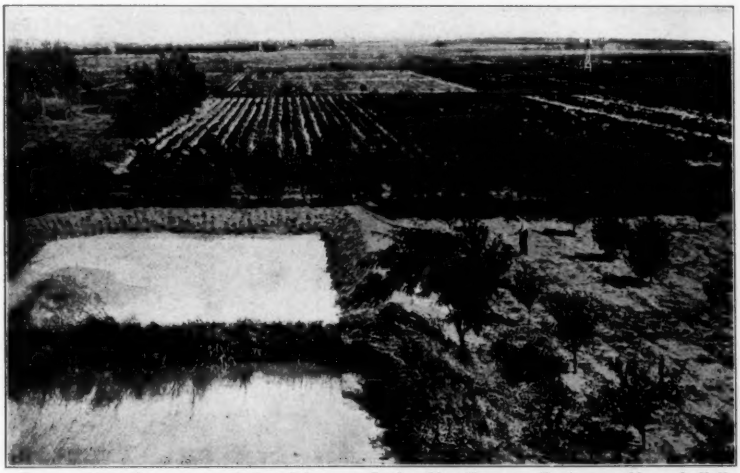

FIG. 4. *Part of a 400-acre irrigated farm at Garden City, Kansas. Fruit, vegetable, and alfalfa crops irrigated from the reservoir in the foreground, supplied by windmills. By the construction of this irrigating system the value of the land was raised from one to fifty dollars per acre.*

of the Rocky Mountains were susceptible of irrigation. After he had returned to New York, he discussed the matter with prominent citizens and gave the proposition great publicity through the columns of the "New York Tribune." The colonization plan there suggested finally materialized in the Union Colony which settled in the Cache la Poudre Valley and founded the town of Greeley. A few settlers were already located in this region, who found a precarious existence in harvesting wild hay and securing pasture in the moister lands of the valley bottoms. These people regarded with scorn the idea which the new colonists entertained of cultivating the bench lands located at greater altitudes along the rivers by the use of water, but ditches were constructed and canal systems laid out, and, in a few years, the

faith of the far-sighted leader of the enterprise and the energy of the settlers were rewarded by plentiful returns. To-day the Greeley district, embracing a number of different irrigation systems, is one of the most successful in the state and is noted all over the country for the excellence and large amount of its agricultural produce. The engineering difficulties to be overcome in building these works were great. The settlers were obliged to go into the mountains, build large reservoirs to impound the flood waters of the stream upon which they had settled, and, as the resources of that stream became exhausted, their engineers contrived means of diverting the waters from streams of adjoining watersheds and carrying them across low divides to supplement the flow of the original stream.

The products which were at first raised and the cultivation of which is continued to the present day, with the addition of other crops which have been found profitable, were the great forage crop, alfalfa, and potatoes. Alfalfa is generally considered one of the most valuable of irrigated crops by virtue of its great nutritive quality as feed for cattle, and because of its remarkable rapidity of growth. In the East, the farmer is satisfied with one good crop of hay a season; sometimes he gets two. But alfalfa under irrigation yields five crops during the growing period, though usually not more than three in Colorado.

Potatoes are usually planted in Colorado after ploughing under alfalfa. Two crops can often successfully be produced. Under irrigation, potatoes in the Greeley district grow to proportions unknown in the East. An idea of the great value of the potato crop in this one district may be had from the record of the year 1894, when, in one part of the district, over 600,000 sacks were produced, valued at $330,000. After paying all expense of planting and harvesting, the resulting profit was sufficient to pay the entire cost of the reservoir under which the crop was raised. This was an unusually good year.

Another product successfully grown under irrigation in Colorado is the sugar beet. In 1899 there were 1,094 acres planted in this crop and over 6,600 tons sold at a value of $26,700. Beet raising is comparatively new in Colorado but figures for the present time, were they available, would show a great increase in the industry.

The Greeley district, while the largest and probably the most successful irrigated portion of Colorado, is but one of a number of similar sections in that state, for much land favorably located along the upper branches of the Platte and Arkansas rivers is being reclaimed in this manner. The 1,160,000 acres under irrigation in 1899 was an increase

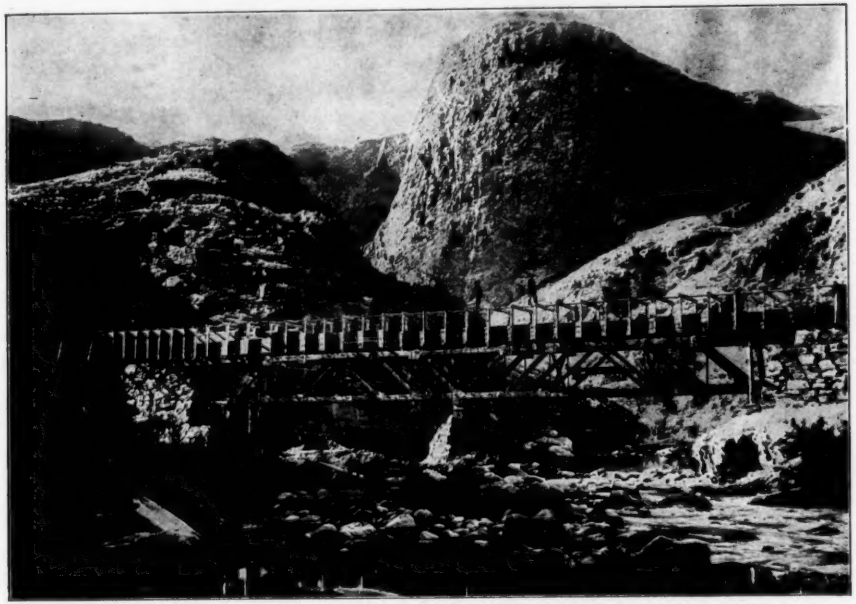

FIG. 5. *A flume carrying water to the Greely district, Colorado, crossing the stream from which it receives its supply.*

of 80.9 per cent over that irrigated in 1889. The value of the crops raised in 1899 was striking, being $15,100,690, and the cost of construction of irrigation works, $11,758,000. These figures are especially suggestive, showing that, in one year, the value of the irrigated crop was about one and a half times greater than the entire cost of the irrigating works which produced them.

WYOMING, THE GREAT GRAZING STATE

Wyoming is another of the great irrigation states and ranks fifth in the list, though its possibilities lie rather in the direction of grazing and stock raising. The average altitude of the state is high, 5,000 feet or more, it is wind-swept, and the climate cool and dry; everything must be grown by irrigation. In one respect, it bears a peculiar relation to the other irrigation states, for within its boundaries rise nearly all the great streams of the West from which water is used for reclamation. The headwaters of the Columbia, the Colorado, and the Missouri are all found among its mountains, but the physical conditions are such that but comparatively little of this supply is available for use in the state.

Wyoming is preëminently a grazing state, but the last census figures show that 600,000 acres were under cultivation by irrigation in 1889, an increase in ten years of 163 per cent, producing crops worth nearly $2,900,000. In spite of the fact that live stock interests are so large, irrigation is of growing interest, for it is coming to be recognized as a necessary adjunct to the grazing interests. The public range, on account of overgrazing, is rapidly deteriorating in quality so that it is not possible for it to support as large a number of cattle as in former years. This fact is recognized, and it is further understood that the remedy lies in the cultivation of the forage crops by irrigation to supplement as much as possible the deficiency. This is most strikingly illustrated by the fact that in 1899, of the 600,000 acres under irrigation, 560,000 were devoted to hay, alfalfa, and other fodder crops.

THE PROMISE OF MONTANA

Montana stands third in irrigated area. Although needing less assistance from irrigation than other states in the arid West, it seems destined to surpass them all in the amount of land which will eventually come under the ditch. At the date of the last census, the state had over 950,000 acres under irrigation, showing the notable increase of 171 per cent in ten years. Montana contains vast areas of fertile

land and is so situated with respect to the sources of a number of large streams that its water supply is more plentiful than that of any of the Western States. Economically, it has had a most interesting history. During the period between 1870 and 1900, it witnessed a remarkable change in agricultural values. In the former year, the value of live stock in the state was at least three times that of all farm land and buildings. In the latter, the live stock interests had gained enormously and were nearly forty times as great as in 1870, but farm values had also increased with such rapidity that they were worth $10,000,000 more than the total live stock interests. At first farming was incidental to stock raising, but, within the thirty years above mentioned, the conditions were completely reversed. This great increase in farm wealth is due largely to the rapid settlement of the valleys and the changed methods which followed the successful application of irrigation to the cultivation of forage and other crops. The interesting statement has been made that in the course of a few years, the value of the agricultural products in Montana will be greater than those of the mines.

GOVERNMENT RECLAMATION IN THE LOUISIANA PURCHASE TRACT

It is too early to state how the future of irrigation in the Louisiana Purchase tract will be affected by government irrigation. Under the Irrigation Act of June 17, 1902, the engineers of the Reclamation Service have been making a thorough investigation in this region to discover irrigation possibilities.

In the region particularly under consideration a number of projects have been found which seem to be feasible, but, until the surveys are completed and a great variety of facts obtained not only regarding the engineering features of the projects but also concerning business questions, such as the possibility of securing needed lands for reservoir and other purposes, the organization of water users' associations and other matters which require much time to work out, it will be impossible to make any definite statements regarding them.

In a general way, however, it may be said that it appears to be possible to reclaim considerable land in South Dakota from streams rising in the Black Hills, in western Nebraska along the North Platte, in Wyoming, in the valleys of the Shoshone and Snake rivers, and along a number of streams in both northern and southern Montana.

If these projects are found to be feasible and are constructed, the result will be several hundred thousand acres added to the cultivated

land in the section. The chances are that much of this land will be reclaimed. What this will mean in the great increase of population that is sure to follow, the increase in business and in land values, the social and political changes that will take place, it is difficult now to predict, but the reclamation of these desert lands by the Government can not but have a profound influence not only on the development of the West but also upon the destiny of the entire country.

GEOGRAPHIC INFLUENCES IN THE DEVELOPMENT OF ST. LOUIS

BY ELLEN CHURCHILL SEMPLE
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THE development of St. Louis has been characterized by a sort of staccato movement; it has been stimulated by a close succession of distinct economic impulses, each quite different in its nature but each nearly related to the geographic environment of the city. The word environment in this connection is a big term, as understood by the anthropo-geographer; it includes not only the city's location and immediate surroundings, but also remote features in the topography, climate, and natural resources of the wide Mississippi Valley. The long westward-reaching line of the Great Lakes with their short portages to the Mississippi streams, the vast system of navigable waterways occupying this central trough of North America, the cold, bleak climate of our Northwest and upper Rockies thickening the fur on the backs of their early four-footed inhabitants, the breach in the western mountain wall just east of the old Mexican city of Santa Fé, the grazing lands of the arid plains, the mineral belt of the Ozark Mountains and of the Appalachians at the sources of the Ohio, the tobacco fields of Kentucky, and the seaport of New Orleans at the terminus of the Mississippi highway, have all been so many conspicuous factors in the environment of St. Louis, potent to modify its history. Now one, now the other, geographic influence has been in the ascendant. In the early decades of the nineteenth century, it was the Rocky Mountain sources of the western rivers with their wealth of beaver skins, while in these recent years it has been the headstreams of the Ohio and Illinois rivers with their wealth of coal. Or the same geographic factor has operated under different guises at different times. The arid plains were, in early days, the feeding ground of the buffalo

whose skins and dried tongues were staples of the St. Louis trade, and these same plains, now divided up into ranches, supply the cattle for the great meat-packing establishments there to-day.

The cities of any new or undeveloped country are primarily commercial centers, markets where the crude commodities of its natural resources can be exchanged for the manufactured wares of some more advanced industrial section. The rapidity of their growth depends always, first, upon their command of an extensive system of inland navigation, because rivers and lakes are the sole highways of a new country; and second, upon the productivity of the country for which they serve as a commercial outlet. When such cities have outgrown the first or purely commercial phase and begin to add industries to their other activities, they necessarily possess many qualifications of successful manufacturing centers. The converging routes of communication which they command insure abundant raw materials and the best facilities for marketing their finished products. Moreover, the capital and labor necessary for large industrial enterprises are either at hand or readily attracted. Hence the geographic influences favorable to the earlier or commercial stage of a city's development continue to operate advantageously in the later stage when industries are combined with commerce. We shall follow the working of such geographic factors in the history of St. Louis.

In the early winter of 1763 Pierre Laclede Liguest, with a party of men and a goodly store of merchandise, came up the Mississippi from New Orleans to the French settlements between the mouths of the Ohio and Illinois rivers, to establish somewhere in that vicinity a trading post whence he might exercise his right, formally granted by the French authorities in New Orleans, to the exclusive trade of the Missouri and uppermost reaches of the Mississippi. But hearing that France had ceded to Great Britain all this territory between the Ohio and the Great Lakes, he located his station on the west bank of the Mississippi where St. Louis now stands, at a point nearly opposite the earlier settlement of Cahokia, which had been a gathering place for the French traders of the Mississippi basin.

The fact that impresses the student of early American history is the remarkable insight displayed by the pioneers of this western wilderness into the geographic conditions of the country and into the vast possibilities of certain favored points. Laclede had all the keen scent of his breed; he ran down the one spot destined by nature for the development of a great commercial center. Twenty miles below the

mouth of the Missouri, where the volume of the Mississippi is almost doubled by the muddy tide of its great western tributary and where therefore navigation was assured even for the growing river craft of a remote future, Laclede built his little town—in this respect "builded better than he knew." The particular site which he chose was a limestone bank extending for about two miles along the river some twenty feet above its flood water, and rising by natural terraces to yet higher ground in the rear. This was a rare advantage on the Mississippi, because that great stream is generally bounded by high perpendicular bluffs, inhospitable to commerce, as one sees them at Vicksburg, Natchez, or Memphis; or by low alluvial plains, exposed to inundation from the annual floods and at all times teeming with malaria. Hence Hutchins, soon after St. Louis was founded, spoke of it as "the most healthy and pleasurable situation of any known in this part of the country." A few years later (1796) General Victor Collot, a Frenchman traveling in the West, found the new settlement to be endowed "with more facility, more safety, and more economy for trade and navigation than any other given point in North America."

Its location for commanding the commerce of the country was indeed unsurpassed. A central position in the highly fertile basin of the Mississippi insured abundant raw products as the basis of its exchanges, and an active selling market as the inevitable population should respond to the call of these tempting valley lands. Here too was the great river crossroads of the country, affording a navigable course from the falls of St. Anthony to the Gulf of Mexico, and from the forks of the Ohio at Pittsburg to the Great Falls of the Missouri at the first terrace of the Rockies, two thousand miles from north to south and as far from east to west. Short, easy portages or swamp-covered watersheds connected the northeastern tributaries of the Ohio and Mississippi with the Great Lakes, and enabled St. Louis to lay tribute upon the furs of the Canadian North. At this central point of the Mississippi Valley was the meeting of the waters. Besides the Missouri and Ohio, the Illinois opened the way to the Chicago portage of Lake Michigan, and the Tennessee and Cumberland served as primitive highways from the southern Appalachians to the mouth of the Ohio. Here were 15,410 miles of navigable waterway available for large river craft, when steamboats had come into use; but the mileage was far greater in the days of the voyageur's canoe and the keelboat of the trader.

When St. Louis was founded, a tide of French immigrants from the

eastern side of the Mississippi, fleeing from British dominion there, gave the little settlement its first marked forward impulse. By 1780 it was a town of over a hundred stone-built houses with a population of eight hundred, almost all French. It drew to itself much of the fur trade north of the Ohio, all that of the upper Mississippi and of the Missouri. As settlement expanded from the east across the Mississippi Valley, the fur trade migrated farther west and was confined for the most part to the Missouri system; but St. Louis derived continually greater advantages from its water communication, with the rapid settling up of the valley and the increasing distances to be covered in collecting raw products and distributing finished merchandise. Through the Ohio it maintained trade connection with Philadelphia and Baltimore; through the lower Mississippi with New Orleans; and through the Illinois and Great Lakes with far-away Quebec.

In the territory east of the Mississippi, St. Louis had competitors in the various Ohio River towns, but in the vast area of the Missouri basin she ruled supreme. It was the fur trade of this country that especially encouraged the development of the city from 1790 to 1840. The hundreds of hunters, fur traders, Indian agents, and military officers scattered over the wild trans-Mississippi country came down from trapping camps or frontier posts in the mountains to St. Louis every spring, when the melting of the snows swelled the volume of the scanty western rivers and made them navigable. Their canoes and pirogues, laden with rich skins, the harvest of their winter hunt, found a ready sale in this bustling market of the West, and went to purchase the comprehensive outfit for the next season's operations. This included the more luxurious articles of food, like coffee (selling before the purchase of Louisiana at two dollars a pound), clothes, ammunition, and cheap wares for barter with the Indians. The sale of these supplies and the incoming peltries greatly augmented the commerce of St. Louis. The skins brought in were beaver, otter, deer, bear, fox, raccoon, wildcat, marten, and lynx; and these served as legal tender in all commercial transactions.

The western fur trade required capital, so big companies were organized in St. Louis—the Missouri Fur Company in 1808, the Rocky Mountain Fur Company in 1822, and the Western Department of John Jacob Astor's American Fur Company also in 1822, besides numerous other smaller organizations. Under their control operations expanded. The Missouri River and its straight-flowing western tributaries made many paths to the rich fur fields far in the heart

of the Rocky Mountains, and to the passes which led over the Continental Divide to the sources of the Pacific rivers. Hence at an early date furs from traders' stations and trappers' camps on the headstreams of the Columbia and the Colorado, on Utah and Great Salt lakes, on the upper Missouri, Yellowstone, Big Horn, and Platte rivers found their way to the Missouri, and came down this common highway of the Far West to the growing city just below its mouth.

Though the fur trade was a potent factor in St. Louis' development till 1845 or even a little later, its glory had passed by 1834. But this date had already seen the sturdy beginning of another commercial movement along a different geographically determined line which greatly stimulated the growth of the city. This was the Santa Fé trade, which began about 1822 and initiated the next step in St. Louis' growth. Far to the west of St. Louis and just beyond the eastern range of the Rockies in the high valley of the Upper Rio Grande lay the old Mexican city of Santa Fé, a territorial capital in the days of Spanish supremacy and an active trading point under the less arbitrary rule of independent Mexico. The commerce of the place was considerable, for it supplied all the population up and down the Rio Grande Valley and carried on a busy trade some three hundred and fifty miles to the south with Chihuahua, an important town of northern Mexico. It bought extensively of American merchandise from the markets of St. Louis, which, because of a peculiarly favorable geographical location, controlled the Sante Fé trade. St. Louis lay on the direct line of water communication from the manufacturing eastern states, whose wares it got by the cheap steamer carriage on the Ohio, and then forwarded again by river to the great elbow of the Missouri. Here began the Santa Fé trail, a wagon track eight hundred miles long, which followed the upper course of the Arkansas and Cimarron rivers across the arid belt of the Great Plains, and rose by imperceptible ascent to the gateway in the Rockies leading to Santa Fé. The outfitting point for this trade was naturally at Independence, where the Missouri boat had to be exchanged for the packhorses and ox-wagons of the trail, but St. Louis supplied Independence with merchandise and was the market for the furs, gold, and silver brought in from New Mexico.

At the time the Santa Fé trade opened, the introduction of steam navigation on the western rivers enabled St. Louis to reap the full benefit of her peculiar location and to increase her commerce with the growing demands of the West. By the methods of poling and

rowing and cordelling on the old flatboats and keelboats, freight up-stream from New Orleans cost fifty cents a pound. The first steamboat reached St. Louis in 1817; twenty years afterwards freight charges for the same distance had dropped to two cents a pound, while over a hundred and fifty steamboats were entering the port of St. Louis in a twelvemonth. As this city had been an important exchange

FIG. 1. *A typical Mississippi River steamboat. These light draft vessels have a large carrying capacity, and it was through the use of fleets of these vessels that commercial supremacy of the Mississippi River came about.*

point in the old keelboat days from 1780 to 1830, so its commercial activity grew in the days of steamboat supremacy from 1830 to 1860. Below St. Louis the depth of the Mississippi is six feet or more, above it is only from three to five feet. This fact differentiated transportation on the upper and lower river and made St. Louis a point of reshipment. Thus it had a natural monopoly of the trade of the upper Mississippi as well as of the Missouri.

As population poured into the central valley of the continent between 1840 and 1860, the lines of St. Louis commerce increased in number and extent, and river transportation, not yet feeling the competition of railroads, was at its height. In 1845 over two thousand steamboats, aggregating 358,045 tons, besides several hundred keel and

flat boats, drew up along the St. Louis wharves in the course of a year. Of these 250 came from New Orleans, bringing fine merchandise of foreign or New England manufacture to exchange for the flour and bacon of the more northerly states; 406 came from ports along the Ohio or its tributaries, laden with agricultural products for the St. Louis market or with manufactured goods which had come in from the Atlantic seaboard by the canals and the Great Lakes. Its increasing commerce, due to the stimulating effect of steam navigation on the western rivers and to the rapid growth of settlement in the vast country tributary to it, is reflected in St. Louis' population, which rose from six thousand in 1830 to over sixteen thousand in 1840 and over one hundred and eighty-five thousand in 1860.

With the rapid decline of river transportation after 1865, following the introduction of railroads, St. Louis had to adjust herself to the new conditions. Though the geographical advantages which she had enjoyed over other western cities now seemed annulled, and Chicago was beginning to win supremacy in the Mississippi Valley, these years saw the beginning of the industrial development of St. Louis. Railroads came into the trans-Mississippi West, but they followed the lines which the river trade had determined; and more than this, in the arid belt of the plains, where shifting, shallow river beds had made water transportation impossible, they supplanted the creeping pace of packhorse and caravan by the express train, and with the settling of the far western states, gave St. Louis a larger and more active market in the wide back-country reaching to the Rockies and beyond. To-day twenty-three great railroads enter the city and two bridges over the Mississippi secure connection with eastern lines, so that few points in the middle West possess superior facilities for rail transportation. These advantages, together with the Mississippi and Ohio waterways, still the most economic means for bringing in raw materials of large bulk, have stimulated the industrial development of St. Louis, while extending the area of its commercial field.

St. Louis had no manufactures of a systematic character prior to 1860. Pork packing and flour milling, those first industries of an agricultural community, were carried on with some activity in those early days; their products, which went to feed the towns and plantations on the lower Mississippi, were packed in barrels and kegs, which were therefore turned out in considerable quantities by the local cooper shops. These industries were closely related to the city's location in the fertile lands of the middle West, in close proximity to the mar-

kets of the slave-holding South, whose energies were concentrated on the production of sugar and cotton.

After the close of the Civil War and the decline of river commerce, however, St. Louis began to avail itself of the abundant natural resources to be found in the State of Missouri and the vicinity. The Ozark region in the southern and southwestern parts of the state yields especially pure and varied natural products. These include coal, iron ore, lead, nickel, cobalt, zinc, barytes, granite, marble, limestone, glass or silica sand, kaolin and other clays; and to them the greatly diversified character of St. Louis' manufactures is directly traceable. Futhermore, the city commands extensive lumber areas in its own state, and finds an abundant supply of coal at its very doors in the extensive fields just across the river in Illinois, while cheap water transportation renders it economically accessible to the coal and iron mines along the sources of the Ohio.

Fuel and extensive water and rail facilities for distribution gave St. Louis the first essentials for a manufacturing center. Beyond these two conditions, we find that St. Louis' three chief industries—the manufacture of smoking and chewing tobacco, slaughtering and meat packing, and the making of malt liquors—are intimately associated with the great agricultural products of the middle Mississippi Valley, and therefore are geographically determined by the climate, soil, and extent of this region. They indicate also a location in a new territory with abundant land, where agriculture remains as yet the dominant occupation.

St. Louis leads the cities of the United States in the manufacture of chewing and smoking tobacco. The value of the product in 1900 was over twenty million dollars, as against the thirteen million dollars' worth made in Louisville, Ky., its close competitor in this industry. Missouri is not one of the great tobacco-growing states, but St. Louis is accessible to the vast supply of the Ohio Valley, which produced one-half of the tobacco crop of the United States in 1900. Louisville, the rival of St. Louis, is the largest leaf tobacco market in the world, but till recently has lacked the capital necessary for extensive manufacture. A few years ago, however, the Tobacco Trust bought up the chief manufacturing plants in both cities, and with the eye for economic production characteristic of all such big industrial combinations, it is shifting the center of its production from St. Louis to Louisville, nearer the supply of the raw material. Therefore the next census report of tobacco production in St. Louis may show a decline.

XUM

In another leading industry of the Middle West, that of slaughtering and meat packing, St. Louis has an active share. The localization of this industry is determined in general by the presence of a climate and soil especially adapted to the production of the corn and hay necessary for feeding cattle, and by the factor of mere area or abundant land, which can be found only outside of the older settled regions with their denser populations. The industry is most highly developed, therefore, in the corn belt of the Middle West, near the cattle ranches of the Great Plains and the stock-raising section of the

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FIG. 2. *Along the water front, St. Louis, as it is to-day.*

upper Mississippi Valley. The meat products of Illinois, Kansas, Nebraska, Indiana, and Missouri constituted nearly three-fourths of the country's total in 1900. These figures indicate the broader localization. Taken more narrowly, we find that this industry must be centered in cities, because it is dependent upon ample railroad facilities for its refrigerator cars, and hence has reached its greatest development in Chicago; but it is steadily migrating westward, following the withdrawal of stock farms and ranches to the abundant lands of the trans-Mississippi and Missouri country before the growing population of the old West. St. Louis has taken advantage of this trend. The products of its slaughter houses have increased in value almost fifty per cent in the last decade and will probably rank yet higher in 1910.

Proximity to the great central corn area and to the barley fields of Wisconsin, Iowa, Minnesota, and northern Illinois has been a potent factor in the brewing industry of Chicago, Milwaukee, and St. Louis,

while the steady demand from the large German population in each of these cities has contributed also to the same end. The manufacture of malt liquors is widely distributed in the United States, because the transportation of the finished product, especially in bottles, is relatively expensive, so that breweries are likely to spring up wherever the demand is great; but peculiar advantages stimulate production on a large scale to supply something more than the local demand. St. Louis ranks fifth among the brewing cities of the United States, and sells its finest beers in a wide range of markets in the Mississippi Valley.

The other active industries of St. Louis include the manufacture of foundry and machine shop products, boots and shoes, flour and grist, bread and other bakery products, paints and oils, and men's clothing. All these tell of proximity to an abundant supply of the raw materials. For instance, the manufacture of paints and oils has thrived because of the soft lead, barytes, and other minerals of choice quality, found in the southwestern part of Missouri. Sometimes the demand has been the stronger agent in determining the supply. Back in the early decades of the nineteenth century, the Rocky Mountain trappers, the Santa Fé traders, and, a little later, the throngs of settlers moving westward over the Oregon trail to the Pacific, made a great demand for patent medicines. St. Louis, as the center for this valuable western trade, responded to the demand and manufactured medicines. This industry naturally grew into the manufacture of chemicals and drugs, and as such takes an important place among the activities of the city.

St. Louis now ranks as the fourth city of the United States both in population and in the value of its manufactured products, according to the figures of the latest census; and yet these figures do not tell the whole story, because St. Louis has overflowed across the Mississippi into Illinois and there developed the towns of East St. Louis, Madison, and Granite City. Located just across from their mother city at the eastern termini of the two great bridges over the dividing stream, they occupy favorable sites for transportation and fuel, are operated by St. Louis capital and enterprise, but escape St. Louis taxes.

The rapid growth which always accompanies marked industrial development in a city is evidenced in St. Louis by the increase of its population from 310,864 in 1870 to over 600,000 in 1903. This advance in population and industries is intimately connected with the rapid development of the extensive country to the west, south,

and southwest of St. Louis, where the city finds its natural markets. The construction of the embryo state of Oklahoma and the opening up of successive strips in Indian Territory have alone contributed no little to the commercial activity of St. Louis. All this broad area is engaged primarily in agriculture and stock raising, except for the mining in certain favored localities; it therefore makes a steady demand for manufactured wares of all kinds, and for these St. Louis is the nearest producing and selling point. Hence the city commands this commercial field as Chicago does the Northwest, and its growth and prosperity will therefore advance with that of the wide territory which constitutes its market.

DENVER—THE QUEEN CITY OF THE PLAINS

BY C. E. CHADSEY
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IT is said that there are few cities which impress the casual visitor favorably. The unpleasant features of a city are generally among its most prominent ones. The smoke, the filth, the tumble-down, ramshackle buildings, generally prove to be the most forcible impressions received by a stranger arriving in a city for the first time.

Seldom, if ever, is this true of the visitor to Denver. Things ordinarily seem to conspire to produce favorable impressions of Colorado's metropolis. The wonderfully clear atmosphere, the panoramic view of the rugged, snow-capped Rockies, many of whose peaks, plainly visible, are from seventy to one hundred miles distant, the varicolored foothills rising from the level prairie ten or twelve miles from the city, give a setting unsurpassed and of untiring interest. (See Fig. 1.)

This favorable impression is increased when the tourist inspects more closely the city. Denver is so young, its growth has been so rapid and its building ordinances forbidding the erection of frame houses so sweeping that in spite of the large area included within the limits of the city, one can find little of the slovenly or unsightly.

One accustomed to the spacious grounds and stately trees of some eastern cities may wonder why when there was so little apparent need for restricted grounds so few seem to have profited by the opportunity, but the care taken almost uniformly by the householders of their rather limited lawns results in a most pleasing general effect.

Denver lawns, like all Colorado lawns, exist only through careful

irrigation, involving more attention than found necessary in eastern cities blessed with more generous rainfall. This doubtless in part accounts for the comparatively small number of spacious lawns found surrounding the average Denver residence.

As compared with the average eastern city, Denver has little in the way of history, but as an example of how in the territory added to our country through the far-seeing statesmanship of Jefferson prosperous, solidly built cities have sprung up where fifty years ago only a few trappers' cabins could be found in the entire territory, its history is of surpassing interest.

For nearly half a century after the cession of the Louisiana Territory to the United States that portion known as the Pike's Peak

FIG. 1. *A panorama view of the city of Denver, showing the rugged snow-capped Rockies, over 75 miles distant.*

country attracted little attention. Some fur companies were early organized and their trappers began to establish stations in Colorado, along the South Platte perhaps in the early twenties. In 1832 a trading post was established near what is now Denver, and while this was followed by other similar settlements in the neighborhood, it was not until the discovery of gold in Colorado that immigration of any consequence commenced. Many stories concerning the first discovery of gold in this territory are in existence, and it is difficult to determine the real origin of the movement westward. Hunters and trappers from as early a date as 1832 had occasionally found gold in the sands of the streams, and probably reports of these findings were circulated in the eastern states for years before they gathered sufficient momentum to secure any serious attention. Probably Colonel Gilpin's report of his observations, made in 1849 through an address given in Independence, Mo., furnished the first really reliable basis for the rumors concerning the existence of gold. These reports, verified by various returning adventurers during the succeeding years, produced the traditional gold excitement as a result of which the city of Denver was founded.

The story of the early attempts to found a city in the vicinity of Denver is of considerable interest. In the fall of 1858 a number of families established a little settlement about six miles from the center of the present city of Denver. About twenty houses were erected and gold digging was attempted in the sands of the Platte at this point. The town was named Montana, but was short-lived as the venture proved unsuccessful and the entire settlement moved down the river in the following spring. About the same time, farther down stream within the limits of Denver, another town named Auraria was established. This settlement proved quite successful and grew with great rapidity. For some time it seemed to be destined to be the leading town of the Pike's Peak country. Here were established churches, newspapers, lodges, and all the organizations ordinarily found in the active western town. A short distance away a rival town company attempted to establish a town to be called St. Charles and prepared articles of incorporation. This venture did not flourish and was soon abandoned.

A little later a new town company was organized and established a town on the site of St. Charles and in honor of the ex-governor of the Kansas territory named it Denver. The date of organization is given as November 17, 1858. (See Fig. 2).

For some time this town was a rival of Auraria, but the founders of Denver were vigorous, energetic men and succeeded in more than holding their own in spite of bitter animosity. The village prospered and in April, 1860, the two towns were united under the name of Denver.

The first census of Denver taken in 1860 seemed to indicate a population of 4,749. It is evident, however, that even at this early date, knowledge of how to pad census returns was entirely equal to the task of producing this remarkable result.

The first railroad running into Denver was in operation in 1870, at which time the city had a population of 4,759, an apparent increase of only ten over the returns for 1860. Since 1870, however, the growth of the city has been most remarkable. In 1900 the census showed that Denver contained a population of 133,359. In 1902, as a result of what was known as the Rush Amendment to the Constitution of Colorado, a number of suburban towns were annexed to Denver, and the entire corporation, now known as the "City and County of Denver," contains a population considerably in excess of the above mentioned figure. This amendment is popularly known as the "Home Rule Amendment" and Denver is, under its provisions, blessed with a degree

of home rule possessed by perhaps no other city in the United States.

The remarkable growth of Denver has been due chiefly to the development of the great mining camps of Colorado for which it is the natural supply center. In addition, however, to these great resources a very rich agricultural and stock-raising region is found in the territory to the north of the city which adds greatly to the resources of the state and furnishes a stability to the city which a mining region alone could not give.

As a result of Denver's early prominence as a commercial center for the Pike's Peak country, it followed that when the railroads began

FIG. 2. *The state capitol building at Denver.*

to form their network of communications through the Rockies, the chief railroad center proved to be Denver. More than one western city owes its prosperity as a railroad center to an apparently fortuitous combination of circumstances. In this case, however, the location was eminently suitable for such a development and it is now well established that Denver will remain the chief railroad center of the Rocky Mountain Region.

The climate of Denver is one of its chief glories. Its winters are mild and open. Little snow falls and there are few days during the year when the sun does not shine and outdoor life is not pleasant and agreeable. The air is dry and possesses a tonic quality due to the elevation above sea-level—about one mile. The rainfall is very light, the annual precipitation being about fifteen inches.

As a natural result of these conditions Denver in common with all Colorado has come to be recognized as a highly desirable place of residence for those who suffer from mild pulmonary troubles. Thou-

sands of Denver's citizens originally came to Colorado in search of health, and thousands more come each year for the same reason.

The mean annual temperature of Denver is about 50° Fahrenheit, and the average number of clear and partly cloudy days is 309. Although Denver owes its great growth to its favorable location as a commercial center for the mining districts of the state, it has, through its proximity to the coal fields, come to be quite a manufacturing and smelting center. There are in operation in the city about fifteen hundred manufacturing plants with an annual output of over forty-two million dollars. This statement often creates some surprise, even among Denver residents, as few have been accustomed to think of Denver as in any way a manufacturing city. It is altogether probable that the future growth of the city will depend to an increasing extent upon the development of its manufacturing interests.

GEOGRAPHICAL NOTES

AREA AND POPULATION OF THE STATES AND TERRITORIES WITHIN THE LOUISIANA PURCHASE.

STATE	Area	Pop. 1900	Chief City	Pop. 1900
Arkansas	53,850	1,311,564	Little Rock	38,307
Colorado	103,645	539,700	Denver	133,859
Indian Territory	31,000	302,060	Ardmore	5,681
Iowa	55,475	2,231,853	Des Moines	62,139
Kansas	81,700	1,740,495	Kansas City	163,752
Louisiana	45,420	1,381,625	New Orleans	287,104
Minnesota*	79,205	1,751,394	Minneapolis	202,718
Missouri	68,735	3,106,665	St. Louis	575,238
Montana*	145,310	243,329	Butte	30,471
Nebraska	76,840	1,066,300	Omaha	102,555
North Dakota	70,195	319,146	Fargo	9,589
South Dakota	76,850	401,570	Sioux Falls	10,266
Oklahoma*	38,830	398,831	Oklahoma City	10,037
Wyoming*	97,575	92,531	Cheyenne	14,087

*Included in part in the Purchase.

RANK OF PRINCIPAL MANUFACTURES IN THE SEVERAL LOUISIANA PURCHASE STATES, 1900.

	Rank in Products.
Arkansas	3 in cotton ginning, 6 in lumber and timber products.
Colorado	4 in coke, 5 in copper smelting, 1 in lead smelting.
Iowa	3 in butter and cheese, 4 in food preparations, 8 in planing mill products.
Louisiana	3 in cotton seed oil.
Minnesota	1 in grist mill products, 3 in lumber and timber products, 3 in linseed oil
Missouri	4 in coffee and spice washing, 5 in confectionery and railway cars.
Montana	2 in copper and lead smelting.

AGRICULTURE IN THE LOUISIANA PURCHASE.

	Rank in Union in 1900	Total Value of Crops in 1900	Principal Crops with Rank in each in Union
Arkansas	20	56,803,494	Corn 14; cotton 6; sugar 8.
Colorado	34	16,857,533	Wheat 28; oats 30.
Indian Territory	32	16,691,142	Corn 25; cotton 10.
Iowa	2	192,286,098	Corn 2; oats 1; barley 3; hay 2; potatoes 5; flaxseed 4.
Kansas	5	112,684,696	Corn 3; wheat 5; oats 12; hay 3; potatoes 10; flaxseed 5.
Louisiana	27	61,272,676	Corn 22; rice 1; cotton 7; sugar 1.
Missouri	7	117,012,895	Corn 4; wheat 9; oats 11; hay 4; potatoes 12; flaxseed 6.
Minnesota	4	113,092,602	Wheat 1; oats 4; corn 21; barley 2; hay 7; potatoes 6; flaxseed 2.
Montana	35	10,516,381	Oats 28; wheat 36; hay 20.
Nebraska	8	92,056,580	Corn 5; wheat 8; oats 5; hay 9; potatoes 11.
North Dakota	13	53,928,010	Wheat 2; oats 14; flaxseed 1.
South Dakota	16	44,069,331	Wheat 3; corn 24; barley 5; hay 13; flaxseed 2.
Oklahoma	24	26,612,442	Wheat 16; corn 23.
Wyoming	48	3,119,023	Oats 41; wheat 39; hay 35.

GRAZING IN THE LOUISIANA PURCHASE TERRITORY, 1900.

	Cattle	Horses	Mules	Sheep	Hogs
Arkansas	.....	.....	166,267 (8)	.....	1,713,307
Colorado	1,164,169 (15)	.....	.....	.....	.....
Indian Ter.	1,263,269 (13)	.....	.....	.....	.....
Iowa	4,077,351 (2)	1,268,046 (1)	.....	.....	9,723,791 (1)
Kansas	3,567,616 (3)	907,156	.....	.....	3,594,859 (6)
Louisiana	.....	.....	141,645 (9)	.....	.....
Minnesota	1,305,331 (12)	.....	.....	.....	1,440,806
Missouri	2,345,272 (6)	908,860 (4)	242,095 (2)	.....	4,524,664 (3)
Montana	.....	.....	.....	4,215,214 (1)	.....
Nebraska	2,421,743 (4)	728,542	.....	.....	4,128,000 (4)
N. Dakota	.....	331,323	.....	.....	.....
S. Dakota	1,203,659	433,644	.....	.....	.....
Oklahoma	1,409,627	.....	.....	.....	.....
Wyoming	.....	.....	.....	3,327,185 (3)	.....

LOCALIZATION OF INDUSTRIES IN THE LOUISIANA PURCHASE.

CHIEF CITIES AND RANK IN INDUSTRY.

Kansas,	slaughtering	and meat	packing	(2) 76,829,139—Kansas City, Kan. (2)	
Nebraska,	"	"	"	(3) 71,018,339—South Omaha (3).	
Missouri,	"	"	"	(5) 42,229,127—St. Joseph (4), St. Lou-	
Iowa	"	"	"	(7) 25,296,518	is (6)

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EDITORIAL

THE LOUISIANA PURCHASE

THE Great Louisiana Purchase Exposition now open at St. Louis has been the means of arousing a deep interest in the significance of the Louisiana Purchase in the political and economic history of our country. When this great region of possibilities was first brought to public notice a century ago the geographic significance and importance of the area were imperfectly realized, and since that time few people have fully appreciated the part that geography has played in determining the history and development of this vast domain.

This number of the JOURNAL has been planned to present a brief and concise summary of the past and present geographic conditions of the Louisiana Purchase tract, in order that teachers may have at hand a good working reference volume, which shall be available in their teaching of this important portion of our country, not only during the present period of popular interest in the area, but also after that interest has subsided.

The authors of the several papers here presented are recognized

authorities in the phases of geography and history which they have severally treated. Of course only the briefest outline of the vast geographic conditions presented on such an enormous scale in this area can be given in the limited space available. For a fuller and more complete statement the interested reader should consult the several volumes and monographs mentioned in the brief selected bibliography. Yet the papers here presented have a distinct value above any larger treatise, inasmuch as only the salient features pertinent to the requirements of teachers have been selected for treatment, and the needs of teachers have been kept constantly in mind, not only in the planning of the number as a whole, but also in the variety of the several papers.

It is hoped that this number may be of distinct value also to those who are planning to visit St. Louis during the coming summer, and particularly to those who, living amid the varied landscapes of the Eastern States, have never seen the vast and impressive long distance views to be gained in those regions of gentle relief which make up the larger part of the Louisiana Purchase territory.

RECENT PUBLICATIONS

Lectures on Commerce Delivered before the College of Commerce and Administration of the University of Chicago. Edited by Henry R. Hatfield. Pp. viii, 388. Chicago: University of Chicago Press, 1903.

A series of lectures on Railways, Trade and Industry, and Banking and Insurance delivered by experts in the several fields. Full of information on little understood problems in commercial life. Helpful to teachers and the general reader. Valuable for the school library, especially where commercial geography is emphasized.

Early Western Travels, 1748–1846. A series of annotated reprints of some of the best contemporary volumes of travel during the period of early American settlement. To be completed in 31 volumes. Vol. I, 1748–1764, pp. 328; Vol. II, 1768–1782, pp. 329. Cleveland, Ohio; The Arthur H. Clark Co., 1904.

The volumes of this series of reprints of early travels will be of great value to all students of the early geography and history of the Western States. The first volume consists of a series of notes of expeditions into the west. The second volume presents John Long's notes on his life among the Indians of the St. Lawrence Basin and Northern New York. Very interesting for the descriptions of Indian life and customs and valuable for history and geography classes. Inviting reading for any one who is interested in early conditions as contrasted with the present. Well annotated and attractively printed.

Geology. By Thomas C. Chamberlin and Rollin D. Salisbury. Vol. I, *Geologic Processes and Their Results.* Pp. xix, 654. New York: Henry Holt & Co., 1904.

An inclusive and clearly written volume on the more familiar phases of geology. Especially valuable to teachers of physical geography or geology. Superbly illustrated and typographically pleasing. To be reviewed later.

A Text-Book of the Physics of Agriculture. By F. H. King. Pp. xvi, 604, third edition, 1903. Published by the author, Madison, Wis.

Although primarily for the student or worker in agriculture, the book includes much of value to the teacher of geography or nature study. The chapters on soils, the uses of soils, soil moisture, relation of air to soil, on ground water, farm wells, farm drainage, and the atmosphere are simple and extremely valuable.

The Louisiana Purchase and the exploration, early history, and building of the West. By Ripley Hitchcock. Pp. xxi, 349. Boston: Ginn & Co., 1904.

A brief and interesting account of history of exploration and development in the Louisiana Purchase. The appendix contains a very adequate series of statistics and is accompanied by a useful index. The book is particularly timely and pertinent to the scope of this number of the JOURNAL.

Around the World in the Sloop Spray. By Captain Joshua Slocum. Pp. xiv, 213. New York: Charles Scribner's Sons, 1903.

An abridgment for school use of the author's well-known volume, describing his trip around the world in a thirty-six foot sloop. Interesting for adults and children. First hand in formation, clearly and forcibly expressed. An excellent geographical reader describing the ways of people in distant lands.

NEWS NOTES

The Eighth International Geographic Congress.— Mention has already been made in the JOURNAL of the Eighth International Geographic Congress which will convene in Washington on September 8th, where meetings will be held on September 8th, 9th, and 10th. On September 12th the Congress will be the guests of the Geographical Society in Philadelphia. On September 13th and 14th sessions will be held in New York under the auspices of the American Geographical Society and on September 15th an excursion on the Hudson will be given by that society. September 16th will be passed at Niagara. On September 17th the Congress will be the guests of the Geographic Society of Chicago. On September 19th and the following days the Congress will take part in the sessions of the geographical sections of the Congress of Science and Arts at the World's Fair, St. Louis. After adjournment, about September 24th, an excursion is planned to Mexico and the Grand Canyon of Arizona.

It is particularly desired that many American teachers of geography should take part in the Congress. It is believed that the time thus spent will be profitable, not only from the value of papers and discussions during the sessions of the Congress, but in no less degree from the advantage of personal intercourse with the geographers of Europe and America, whom the Congress will bring together. One or more sectional meetings will be devoted to the educational aspects of geography; contributions on this branch of the subject are desired

from experienced teachers. The titles of such papers may be sent to Prof. R. E. Dodge, Teachers College, New York City; titles of papers on other subjects may be sent to Prof. W. M. Davis, Cambridge, Mass. More than twenty papers on educational geography have already been promised by leading geographers and geography teachers in elementary, secondary, and normal schools and colleges in the United States. Other papers will be given by European geographers, and the list is still incomplete.

Circulars concerning the Congress may be had on addressing The Eighth International Geographic Congress, Hubbard Memorial Hall, Washington, D. C. Membership may be acquired by members of geographic and cognate societies on payment, to the preceding address, of $5.00. Persons not members of such societies may acquire membership in the Congress by the same payment after election by the Presidency. The privileges of the Congress, including excursions and social gatherings, can be extended only to persons holding membership tickets. The published proceedings of the Congress will be sent to all members, whether they attend the sessions or not. By special vote of the committee of Arrangements, associate membership may be acquired by School Superintendents and School Teachers, on the payment of $2.50 and election by the Presidency. Associate members will not receive the publications of the Congress but will be entitled to all other privileges. Correspondence and remittances should be addressed to the EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS
HUBBARD MEMORIAL HALL Washington, D. C.

Papers on Geography announced in preliminary program of meeting of National Educational Association, to be held in St. Louis, June 28–July 1:

June 28, 2:30 P. M.

Applied Geography, illustrated from the Louisiana Purchase. Paper by Arthur G. Clement of the University of the State of New York.

July 1, 2:30 P. M.

How Can Teachers Make Better Use of "Out of Doors" in Teaching Geography?

What Does the St. Louis Exposition offer as Illustrations of the Local Reactions of Man upon his Environment in Every Part of the World?

Paper by Professor M. S. W. Jefferson, State Normal College, Ypsilanti, M ch., with discussion.